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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Reagan Backs Down From Data Base Scheme

By Bill Laberis
CW Staff

WASHINGTON, D.C. — The Reagan administration has backed down from a plan to create a computerized data base of all the nation's welfare recipients. The move follows allegations that the proposed plan violated constitutionally guaranteed privacy rights.

Instead, the U.S. Department of Health and Human Services is now proposing a vastly scaled-down version of the plan to detect welfare cheats.

The new proposal, which may not involve the creation of any new computerized files, seeks to allow local welfare agencies to access the files of four major federal agencies: the Social Security Administration, Office of Personnel Management, Veterans Administration and Railroad Retirement Board.

This plan differs greatly from drafts of the original proposal for a National Recipient Information Sys-

(Continued on Page 6)

A Business-Like NCC: Suits Replace Sandals

CHICAGO — The maturing of the computer community was evident here last week as pinstripe suits and leather briefcases won out over beards and leather sandals as the preferred dress among the more than 73,000 attendees at the National Computer Conference.

The 30th edition of the computer community's annual "rite of spring" also stressed applications of proven systems over flashy new technology, again reflecting the attendees newfound business-like approach.

The maturing of the industry was most evident on the main convention floor — the "penthouse suite" — where the older, more established mainframe and minicomputer vendors were joined by a raft of micro vendors who stressed business over hobby and home applications in their first major penetration of NCC's main exhibit hall.

However, several smaller, newer and perhaps more innovative firms were stuffed into the basement of the cavernous convention hall here — and also received good attention.

But while the exhibits stressed business and proven applications of the computer technology, the technical session program did not keep pace. The program was dominated by the more traditional academic-oriented papers, although some effort was made this time around to give a smattering of sessions that would be of interest to

(Continued on Page 2)

Users Want Proven Solutions

No Big Product Splashes at Show

By Brad Schultz
CW Staff

CHICAGO — Perhaps the most significant product announced here last week wasn't even announced at the National Computer Conference — it was announced in a hotel suite rented for the occasion.

At the show itself, few products were introduced. That reflected the tone of the exhibit floor, where the action was business-like as attendees made it clear they wanted to see tried-and-true solutions.

The product introduction with the most pow — a 32-bit minicomputer from Systems Engineering Laboratories, Inc. — was not introduced on the show floor. The Concept 32/87 reportedly benchmarks at three times the rate of the Digital Equipment Corp. VAX-11/780 (see story on Page 8).

Perkin-Elmer Corp. gave NCC attendees more evidence that AT&T's most important penetration into DP shops may be through software, not the hardware mentioned in federal court dockets.

PE gave its 3230 superminicomputer Bell Laboratories' Unix operating system, which already runs on many DEC systems and is the standard operating system for software development at BBN Computer Corp. The 3230 now has a version of Unix developed by The Wollongong Group under Bell licensing in Palo Alto, Calif., that reportedly supports up to 128 users in multiprogramming, time-shared environment.

Bell is allowed to sell software like Unix, provided it was developed internally to improve efficiency in Bell's voice communications business.

Media Coverage

Several vendors timed important product announcements for media coverage during the week of NCC. The biggest surprise was Data General Corp.'s revision of its Xodiac network architecture, which is now compatible with both IBM's Systems Network Ar-

(Continued on Page 10)

BTI at Top, GA at Bottom In Datapro Mini Ratings

By Tim Scannell
CW Staff

DELRAN, N.J. — Minicomputers from BTI Computer Systems, Inc. fared better than those from Digital Equipment Corp., Data General Corp. and even IBM in Datapro Research Corp.'s recent annual survey.

But, users told Datapro, machines from General Automation, Inc. leave a lot to be desired in terms of vendor support and software. This marks the second year in a row that GA has managed to crowd the other minicomputer contenders out of last place.

As the charts beginning on Page 45 indicate, last year's top winner, Tandem Computers, Inc., slid down to third position, closely trailing BTI and Point 4 Computer Corp.

Although Datapro contacted only six users of BTI's 5000 computer system, the 16-bit multiuser time-sharing minicomputer scored highest in overall user satisfaction with a near-perfect rating of 3.8. Tandem scored a 3.7 in overall user satisfaction, while Point 4

(Continued on Page 44)

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Higher Software Productivity Linked To Fine-Tuning Development Process

By Marcia Blumenthal
CW Staff

CHICAGO – Improving software productivity requires the fine tuning of every phase of the development process – from user involvement to selecting the right combination of productivity aids to building maintainability into the design of the system.

That was the view presented by a group of panelists speaking to an overflow crowd at a National Computer Conference session here last week.

Involving users in the development phase will improve productivity tremendously, suggested William Fronk, vice-president and manager of systems technology for Chicago's Continental Bank.

At Continental, users participate in the bank's automation planning process. Basic to this process is homing in on projects that will enhance the overall corporate objective.

Fronk likened this to evaluating an investment portfolio, whereby managers evaluate which investments are funded and which get dumped.

To do this, managers on the user side who can approve projects should be part of the planning group as well as those managers on the system development side who can commit the resources to develop new systems.

Besides management commitment, Fronk said the bank's program has two other criteria – billing users for all system development work and requiring users to submit formal project requests.

"If the users know they will pay, then they examine requests and filter out the less worthwhile ones," Fronk said.

Continental uses a checkpoint process where each stage of the planning process and development is reviewed and approved, before another phase begins. Moreover, users are required to develop the user manual for the system. This solidifies the design process and is the basis for system walkthroughs which are used to detect conceptual errors in the proposed system, he noted.

Another technique for improving the productivity of system design is selecting a compatible group of productivity tools.

There are many applications development tools on the market, and the DP manager's job is to determine which of these tools work together efficiently, said Jane G. Morse, head of the software engineering unit at Arthur D. Little, Inc. (ADL).

Dominant Functions

Morse and her team at ADL have devised a matrix for classifying applications according to their dominant computing function. Simply stated, these functions are computing, output, data base management, input and control tasks. For example, a payroll application is one which is output-dominated, she noted. Therefore, in selecting tools for such an application, output features should be most heavily screened.

Applications disasters are generally caused by a bad combination of tools. "If the tools are too complex for the job, then the application takes too much time to develop," she observed. And if the tools used are too simple, they will have to be manipulated too much.

Although most productivity issues address the design phase of an application, maintenance of that application is usually neglected, charged Carma McClure, an assistant professor at Northwestern University.

CW at NCC

NCC Puts on Business-Like Face

(Continued from Page 1)

the real world.

Overall, the more than 525 exhibitors were pleased with the business-like atmosphere and crowds, even though few of them took advantage of the show to announce new products. In fact, the only mainframe announcement came from a firm that did not even exhibit on the floor, using a hotel room to unveil its 32-bit mini (story on Page 8).

Software was on everyone's mind, even though it was not in abundant evidence on the convention floor in stand-alone booths. However, all the hardware vendors – from Apple and Atari to Burroughs and IBM – stressed their software over the hardware features of the systems on parade.

Of the nearly 3,500 foreign visitors, the Japanese were the most visible; many new Japanese vendors used the show to test the waters of the American marketplace.

Representatives from more than 12 countries attended, including two from the People's Republic of China.

This Week

IN DEPTH

Information Engineering — Part 1 . . . Follows Page 68
Computers and Graphics — Part 2 . . . . . ID/23

NEWS

Angry Synergist Dealers Slap DG Practices 4
Capacity Planners Decry Methods 5
Don't Work in Vacuum, Office Planners Told 6
Info on Ethernet Levels Ready This Summer 7
SEL Brings Out 'Most Powerful' 32-Bit Mini 8
Graphics Offerings Show True Colors at NCC 9
NCC '81: A Photo Feature 11
NCCers Discuss ACM, DPMA Curricula Issues 12
Opportunity Sighted in Software Maintenance 13
Blumenthal Urges Industry Effort on TDF 14
Reusable Code Prescribed for Productivity 15
Pioneer Day – Misty Eyes, Laughs, Ovation 16
Quality Assurance's Aim 17
Capacity Planning Called Management Issue 18
Technology Transfer Issues Eyed 19
Computing Power Seen Spreading to Populace 20
Vendors Warned of Micro Incompatibility 21
Computers Not Creating Whiz Kids 22
Standards Seen Needed for Data Dictionaries 23
Today's Historians Likened to 'Seed Corn' 24
Beal Urges New Breed of Informatics Expert 26
Panel Criticizes ISO Model for Shortcomings 27
Packetized Voice Seen Impacting Workstations 28
DBMS Styles Held to Differ 30
Data Base Technology Said Lagging Theory 31
Advances in DBMS Create Gap 32
Small Systems Language Technology Attacked 33
Corporate, Collegiate MIS Reciprocity Urged 34
Japanese Focus on Software at NCC This Year . . . 35
Japanese Expecting to Move Up at NCC 36
Bellisario Urges Imagination, Innovation 37

EDITORIAL

Editorial: NCC Grows Up 58
Taylor Report: Forth Programmer Power 59
Twig on DP Branch May Hold IBM Solution 59
Business vs. Political Managers 59

SOFTWARE & SERVICES

Purchased Report Writer Aids In-House Design . . . 63
Panvalet Compatible With IBM's SPF 64
Univac Adds Enhancements to V77 67
Honeywell Manufacturing System Fits DPS 6 68

COMMUNICATIONS

Tour of Networks Shows Need for Switches 71
Northern Telecom 76 Made SNA-Compatible 72
Phoenix Digital Unveils Network Control Modules . . 75
Communications Processor Performs Buffering 76

SYSTEMS & PERIPHERALS

Inforex Rebounds With DDP System 77
Xerox Offers Color Printer 78
Ink Jet Printer Suits Medium-Speed Use 80

MINIWORLD

Early Reports Describe Apple III as Lemon 81
Desktop System Uses Hard Disk 82

COMPUTER INDUSTRY

New Track Urged for Software Vendors 83
Informatics Making Plans to Offer Hardware 83
Administration to Push Services Trade Overseas . . 84
Fujitsu Outpaces IBM Japan in Japanese Sales . . . 85
Adapso Mum on New Position Paper on IBM 86
Parties to Lawsuits Finding Courts Expensive 87

ADVERTISING INDEX 134

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REPORTER: Mr. President! Are there any reasons for this name change that weren't covered in your prepared statement?

PRESIDENT: No, it's all there. As I mentioned SyncSort has become the best-known sort in the world. It's now used by 69% of America's major data processors, according to the latest IDC survey. Then, too, the name SyncSort has become synonymous with leadership in sorting technology. These are powerful recognition factors. We couldn't see any reason to go on calling our products by one name and our company by another. It's as simple as that. Yes, the lady on my left.

REPORTER: I seem to recall that you received a patent on SyncSort. Am I correct in that?

PRESIDENT: Yes, last July we received a U.S. Patent on many of the "novel sorting innovations" we've made over the years. These are now embodied in SyncSort, and they make it possible for the user to do his sorting work for the fewest possible computer resources. Incidentally, these innovations underlie all modern, efficient sorting. Without them, you'd be back in the stone age. Yes, sir.

REPORTER: Is performance the only reason for SyncSort's popularity?

PRESIDENT: Not by any means. Two other reasons are becoming increasingly important. One is that buzzword productivity. As the industry has become more "programmer-bound," we've built in a host of labor-saving features that reduce programmer time for common non-sorting functions. The second reason for SyncSort's success is simply customer service. No matter how well you design a sort program, the wide range of user requirements makes it imperative that you provide fast, accurate sorting advice. I'm particularly proud that 85% of all customer requests for technical service are now resolved within 24 hours. Yes, ma'am.

REPORTER: Then if I understand you, this name change doesn't signal any great change in your method of operation. It's simply a way of reminding the public of what made you famous.

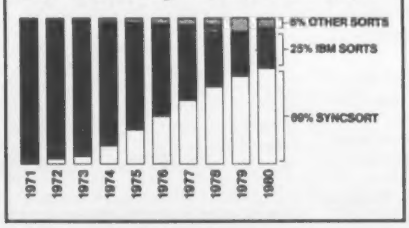
PRESIDENT: Exactly. We're like a man named George Herman Ruth who decides to change his name legally to Babe.

REPORTER: Well, at the risk of sounding churlish, I'll remind you that Babe Ruth wasn't a software company. He was a homerun hitter.

PRESIDENT: So is SyncSort. Thank you ladies and gentlemen. Now if you'd care to join us for refreshments...

Chart of the Month:

Growth of SyncSort OS users



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At Pre-NCC Meeting

Angry Synergist Dealers Slap DG Practices

By Marcia Blumenthal
CW Staff

CHICAGO — A group of angry Data General Corp. dealers met here the weekend before the opening of the National Computer Conference to develop a strategy to cope with what they consider devious business practices by the mini maker.

More than 15 present or former dealers of the Synergist system and a small cadre of lawyers joined in the all-day round-table discussion.

The meeting was called in part because of DG's February decision to phase out the Synergist program. That decision could leave users at risk; Synergist dealers claim DG's promised support for the estimated 1,000 installed systems will be spotty.

Spearheading the group is Robert Hahn, president of Hahn Enterprises of Grafton, Wis., who at one time was a leading member of the Synergist dealers organization. Hahn has filed eight suits against DG employees or former DG employees, alleging a variety of harrassment tactics, including sabotage and slander.

DG, in turn, has filed a suit against Hahn for nonpayment of about $200,000 worth of equipment, according to Lawrence Seligman, vice-president and general manager of DG's Small Business Systems Division.

Ad in WSJ

Hahn placed an advertisement, which some observers called inflammatory, in the May 4 issue of the *Wall Street Journal*, in which he urged those DG users and OEMs who have gripes against DG to submit their complaints to a specified post office box.

These complaints will be reviewed by Hahn and a group of lawyers who will try to classify them in order to determine whether to institute lawsuits against DG.

However, three noted computer lawyers who volunteered to come to the meeting said the dealers should be aware of what it takes to sue a company like DG.

Hahn claimed that about 60 DG end users and OEMs asked if they could attend the meeting, but he decided to limit attendance to Synergist dealers for the initial get-together.

The Synergist program began in earnest in 1977 when DG acquired Digital Computer Controls, Inc. (DCC), a company which reportedly admitted to using DG trade secrets to develop a DG Nova-compatible processor.

What was unique about DCC was that it had developed application software to run under its EOS operating system.

Rather than abandon the Synergist program, which at the time DCC was acquired had about 40 dealers, DG recognized DCC as a subsidiary and pledged to foster the Synergist program with both hardware and software support, recalled Hank Wilcox, president of Systems Support Group, a Winston-Salem, N.C.-based dealer.

Wilcox was one of the first dealers to sign on with DCC before it was acquired by DG and participated in developing, with some other dealers, application software — APPL-W and APPL-M geared for the wholesale and manufacturing industries.

"DG met with dealers individually and collectively and said it would support the applications programs and support the hardware," Wilcox said.

Although estimates of the number of DCC systems installed have been pegged at 300 to 3,000, DG's Seligman placed the number at 1,000.

Despite these promises for service, many dealers at the meeting maintained support was slow in coming. Moreover, they claimed the APPL software didn't work as advertised by DG. Many dealers spent upwards of $100,000 to modify the software.

In response to these allegations, Seligman questioned whether these dealers had maintenance contracts with DG or whether they were on a time and materials basis. Back in 1978 the company's support services were weak, he conceded, adding that service preference was given to users with maintenance contracts.

Wilcox charged that APPL worked for demonstration purposes, but when the data was loaded, the program had file problems and lost indices. He claimed DG's APPL product offering was far more extensive than the product that eventually was delivered.

Dealers complained that after they discovered the software was expensive to redesign, they refused to sell the number of systems they had agreed to sell and that DG was "hard-nosed" about keeping dealers to those contracts. As a result, DG "charged back" the amount for the OEM quantity discounts they had given dealers under contract.

"Let them sue me," countered Terry Patton, president of Cleveland Business Systems, who signed up to sell six systems, priced between $40,000 and $60,000 in his first year as a Synergist dealer.

One of Patton's users wanted an upgrade and DG refused to deliver the equipment unless Patton signed an agreement to sell another six systems. He signed in order to service his user, but has no intention of selling more Synergist systems.

However, as far as the dealers are concerned, the coup de grace came in February when DG announced the end of the DCC Synergist program. At that time the firm offered dealers the option of becoming dealers for DG's R-DOS/Business Basic or for Icos/Cobol. But, applications written for EOS will not run on these systems and the conversion cost will no doubt cost millions.

Seligman maintained DG would continue to provide support for those DCC systems, but the program was being phased out because it was not profitable.

DG Exec Explains Why Vendor Dropped Synergist

By Marcia Blumenthal
CW Staff

CHICAGO — Data General Corp. recently decided to drop its Synergist program because it was not as successful as the company's other small business system offerings, according to a company vice-president.

Despite the decision to end that program, DG will continue to provide support for the 1,000 systems it estimated are installed at user sites, claimed Lawrence Seligman, vice-president and general manager of DG's Small Business Systems Division.

DG became involved with the Synergist dealer network in 1977 when it acquired Digital Computer Control, Inc. (DCC) after that company admitted to using DG trade secrets to produce a Nova-compatible processor.

When acquired, DCC had about 40 dealers and DG said it would continue to invest in that system to develop additional operating and application software and to provide maintenance to the installed base. The Synergist system was DG's entry into the turnkey systems market.

Although the number of Synergist dealers eventually climbed to about 90, some of those dealers are now miffed at DG's decision to drop the program.

While fostering the Synergist program, DG was also investing heavily in its R-DOS/Business Basic and Icos/Cobol systems. All of these systems were about equal at the time, but R-DOS and Icos have been far more profitable for the company, Seligman responded during an interview at NCC.

When asked whether the DCC/Synergist flap would further tarnish the company's image, coming on heels of continued poor financial performance and massive company reorganization, Seligman said a Fortune 500 company has to take the knocks of negative publicity.

Rather than continue investing in a losing program, DG in February offered Synergist dealers the option of selling Rdos and Icos-based systems. Those dealers who want to convert will be provided with some system engineering assistance and be given a break on the licensing fees for those operating systems, Seligman said.

However, some dealers are miffed because their applications, both those provided with the Synergist system and those developed by dealers, will run only on the EOS operating system.

Although conceding that dealers will have to undergo considerable expense converting their applications, Seligman claimed that in the long run the effort will pay off as there is much more application software available for R-DOS and Icos systems than EOS systems.

Although Seligman was not informed about the specifics of the meeting or who was in attendance, he speculated that those disgruntled dealers may have been some of the less successful Synergist distributors.

What It Takes To Sue DG

CHICAGO — "Suing Data General Corp. is not for the faint hearted," warned Rocky Unruh, one of several attorneys at a pre-National Computer Conference DG Synergist dealers' meeting held here recently.

Unruh should know. An attorney with the law firm of Bingaman and Davenport in Sante Fe, N.M., he formerly represented SCI Systems, one of the original plaintiffs in the DG antitrust trial now in its second month. SCI recently settled out of court with the mini maker.

Unruh said that preparation for that trial took the litigants two years and required 500 depositions. They have spent between $4 million and $10 million in the past 2-½ years, he estimated.

About four of the dealers at the meeting said they were involved in or considering litigation with DG or its employees. Unruh cautioned those dealers, saying that "DG is not the kind of company that will willingly settle a case. It will fight all the way."

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Capacity Planners Decry Methods

By Tom Henkel
CW Staff

CHICAGO — The keys to capacity planning are there. But they are hard to find, hard to validate and different for almost every user.

Speaking at one of the sessions offered at this year's National Computer Conference last week, three capacity planners from IBM and one from Michigan Bell told attendees there are no simple solutions to capacity planning.

Methods for evaluating how much of a processor is being used and for making projections on how much expansion will be needed are still in their infancy. And, the capacity planning experts pointed out, CPU utilization is only half the problem — I/O utilization is an equally important issue.

Methods for evaluating that function are even less advanced than those for CPU utilization, they noted.

Michigan Bell's Philip F. Curtiss said IBM's Usage philosophy on capacity planning is the best he has found. But after using the IBM method — which consists of a series of programs and basically helpful hints — for the past three years, Curtiss said he found the method erratic at best.

Michigan Bell has used four different versions of Usage, each an evolutionary extension of the previous version. The first two plans resulted in moderate success, with Curtiss' shining moment coming in a two-month period in 1978, when he predicted processor utilization within 2% of the actual figures.

But the more recent third and fourth achieved less impressive success, with the latest plan being a virtual disaster, he reported.

Problems with the method revolved around several issues, according to Curtiss. IBM's facility managers, such as Resource Management Facility (RMF) and System Management Facility (SMF), do not offer enough information on what is actually going on inside a processor to produce accurate predictions on future CPU utilization.

Furthermore, capture ratios that are used to adapt data from IBM resource managers for capacity planning change with every new software release. Hence, even with new capture ratios, which Curtiss said are difficult to get from IBM, the change in the basic utilization numbers often invalidates previous RMF and SMF data.

IMS Users

Curtiss urged IBM to develop a method of evaluating how many users are working with the IMS data base management system.

Many IMS users accessing the data base from different segments of a system can often distort CPU usage projections, Curtiss said.

The Michigan Bell capacity planner said asking users the right questions is often more important than the statistical analysis of raw data.

Curtiss cited as an example the fourth version of Usage, which predicted Michigan Bell's processor usage would increase by only 5% during 1981. The actual processor usage far exceeded that projection by the first week of April.

But just keeping track of CPU utilization is only a small part of effective capacity planning. As Curtiss pointed out, if a systems center suffers from all its I/O channels being busy, acquiring another processor may not be an economical way to solve the problem.

CW at NCC

Joseph Major, representing IBM's Field Support Center in Montreal, said the capacity planning function involves four major areas: throughput, (the traditional analysis of CPU utilization and response time) relative I/O content (the I/O performance as it relates to the relative CPU throughput), channel path time (or the wait time for a request to go from the processor to direct-access storage devices (Dasd) and back to the CPU) and Dasd time (the actual time it takes a tape or disk drive to process a request).

If the user can effectively determine any two of the performance criteria, the other two can be derived mathematically, Major said.

The advantage of Major's thesis is it can be determined independently of hardware and software, an obstacle he said has long been a stumbling block to capacity planning.

While Major offered some mathematical formulas to determine utilization in each of the defined utilization categories, he cautioned that each site is different and the results of RMF or SMF data, for example, are neither good or bad, they just reflect what is going on in a given system.

CW Photo by A. Dooley

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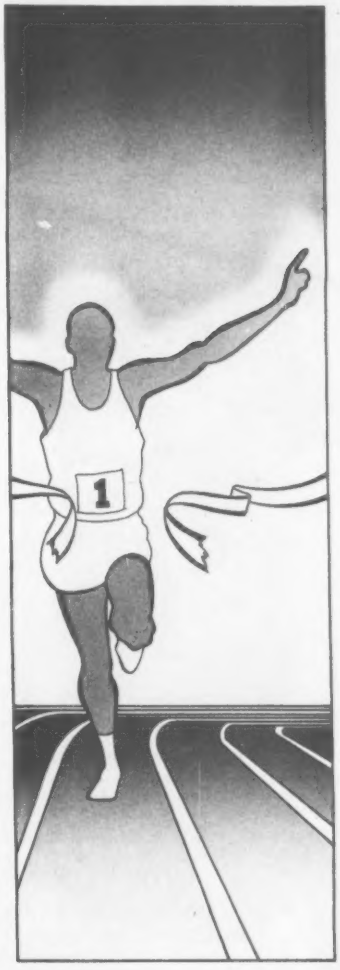

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Environment Less Structured

Don't Work in Vacuum, Office Planners Told

By Jake Kirchner
CW Washington Bureau

CHICAGO — The purpose of office automation is to allow workers to be more productive, not to force them into a more formal work environment, attendees at the National Computer Conference were reminded here last week.

Designers of integrated word and data processing systems should be trying to solve business problems and not posing "technical solutions in a vacuum," Robert J. Elliott of Arthur Andersen & Co. told an overflow crowd at the early NCC session.

"We as systems designers and implementers have to face the fact," he said, that "the knowledge worker works in a less structured environment" than do members of the data processing department.

"Maybe we just need to supply the tools" and let them decide how to apply them in their environment," suggested Elliott, director of Arthur Andersen's office automation consulting practice.

James Tunis director of research at Lincoln National Life Insurance Co., agreed with Elliott, saying systems de-

CW at NCC

signers should not dictate to each employee the functions of an integrated system to which he can have access.

"Let's let the users choose what they want to use," Tunis said. Lincoln's approach to office automation, he said, is to put into a single workstation all the capabilities of the system and let the individual worker use them as he sees fit.

In fact, he continued, this is the only approach that is practicable in a large organization. When designing Lincoln's system, the company found various organizational units were changing so rapidly that it would have been impossible to tailor separate parts of the overall system to individual end users' needs, he said.

Of the approximately 3,500 employees at the home office in Fort Wayne, Ind., some 350 Lincoln employees now have their own terminals and about 200 others are occasional users, Tunis said.

All users have access to the complete range of word processing and data processing functions of the system, he said, adding the system will probably grow to include as many as 2,000 terminals to serve all the secretaries and "knowledge workers."

After assessing the workers' needs, the company concluded "that maybe what we should do is just simply put together a tool kit . . . and give everyone a little training in all the areas," Tunis said.

The system design concept was to "give people as much functionality as we can in one box," Tunis said.

The results so far have proven the desirability of that concept, he said, noting that the company's chief financial officer, who uses the system about three-and-one-half hours a day, often uses the word processing functions of the system. The firm's secretaries, he added, "use a little of everything," including the system's graphics capabilities.

By giving all users the full range of functions and letting them use them as they want, the company helped lessen what Elliott's colleague Evelyn Wilk called "the sense of loss" that workers feel when their jobs are automated.

All office automation "interrupts the very subtle and unconsciously worked-out environment" of the office worker. When we automate, she said, "we are in effect changing the rules of the game by which [workers] have learned to survive."

CW Photo by A. Dooley

Don Mink shows Louis Horton the latest Tab screen gems.

Office Gear Seen Lagging In Quest for Productivity

By Bob Johnson
CW Staff

CHICAGO — "American industry is falling behind in office productivity," according to James H. Carlisle of Office of the Future, Inc.

The U.S. has become a post-industrial economy that needs new technologies. Chief among them, Carlisle said here last week at the National Computer Conference, are communications technologies, which hold the key to the successful implementation of the automated office in coming years.

Managers — not clerks and administrative personnel — are most in need of help, Carlisle said. Managers who cannot adapt to imminent technological changes — including the adoption of broadband networks, integrated graphics, digital and voice networks and dedicated multitasking microprocessors — may be lost in the office of the future.

"While managers don't rely on computer models to make decisions, they do want to use technologies they are familiar with," Carlisle said.

Word processing companies are moving into communications that rely on central data bases and communications controllers, and this fact further underscores the importance of communications in the automated office, Carlisle said.

Such well-known communications companies as GTE, AT&T and Xerox Corp. are all gearing up for the new office. GTE, with its acquisition of Telenet and its offspring, Telemail, seems especially well-positioned to assist the manager of the office, Carlisle said.

In the same vein, Carlisle predicted that voice networks that can store and forward messages will come into their own, but that slow growth will characterize the digital voice field.

AT&T's Advanced Communications Service (ACS) has a very questionable future, according to Carlisle, because it has been plagued with problems so far. However, the company's Unix operating system will "shine."

Terminal languages "are not well developed for office automation," Carlisle said, mentioning that Xerox has made a "revolutionary" breakthrough with its introduction of the Star professional workstation.

"Xerox will push the industry into its style of terminal design," Carlisle said. He claimed that the human factors and ease of use of the Star system are just what is needed in the office of the future.

Reagan Plan Scaled Down

(Continued from Page 1)

tem [CW, April 20]. The latter called for a computerized super-file of over 25 million welfare recipients, a file that could be accessed on request by an unspecified number of state and local agencies.

The original plan also called for the accessing of employment and income data held by the Internal Revenue Service, which the revised plan does not.

For its part, the Health and Human Services Department has categorically denied ever having proposed the computerized super-file. A department spokesman said that the draft proposals of the National Recipient Information System that freely floated around the halls of the U.S. house and senate buildings last month did not emanate from the department office.

But according to the *New York Times* and other published reports, the draft proposal had been sent to Speaker of the House Thomas P. O'Neill Jr. as part of the department's overall welfare revision program. The draft was accompanied by a cover letter signed by department Secretary Richard S. Schweiker.

Reports of the draft proposal triggered a strong blast from the American Civil Liberties Union (ACLU). John Shattuck, national director of the ACLU here, told *Computerworld* that the proposed super-file was a clear violation of federally ensured rights of privacy and that the ACLU would likely contest the proposal in court should it gain congressional approval.

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Info on Ethernet Levels Ready This Summer: Xerox

By Phil Hirsch
CW Washington Bureau

CHICAGO — Xerox Corp. is planning to announce specifications for one or more higher levels of its Ethernet protocol this summer, a company official reported here last week at a National Computer Conference session.

Senior Staff Engineer Robert S. Printis, one of the managers of Xerox's local-area network development effort, also reported that voice messages have been transmitted experimentally on the developmental Ethernet system at Xerox's Palo Alto, Calif., research facility. "Nothing in the technology precludes the transmission of voice," he said, but declined to say whether Xerox plans to support this capability commercially.

Printis was one of four speakers — the others came from Intel Corp., Digital Equipment Corp. and Mitre Corp. — who discussed the present status and future prospects for Ethernet-type local-area networks. The first two companies, along with Xerox, are the main promoters of Ethernet at the moment. They have jointly published a specification — known informally as "the Blue Book" — which they are trying to establish as a de facto industry standard.

Book Specifications

Appearing with Printis at the NCC session were David Potter of DEC and Phil Arst of Intel; Gregory T. Hopkins of Mitre Corp. served as session chairman. Some key points covered were:

• Xerox has installed 10M bit/sec Ethernets at "a number of sites," but the users have requested anonymity. This statement by Printis apparently was meant to counter an often-voiced criticism of Ethernet — that as implemented so far, it will support data rates only up to 3M bits/sec, and therefore lacks sufficient capacity for high data rate applications like video teleconferencing and computer to computer file transfer.

• Carrier-Sense Multiple Access/Collision Detection, the contention allocation method chosen by Xerox, Intel, and DEC for the Blue Book specification, was picked because it is a simpler, more thoroughly developed, and better tested scheme than its chief competitor, token passing. Baseband transmission was chosen instead of broadband for basically the same reasons.

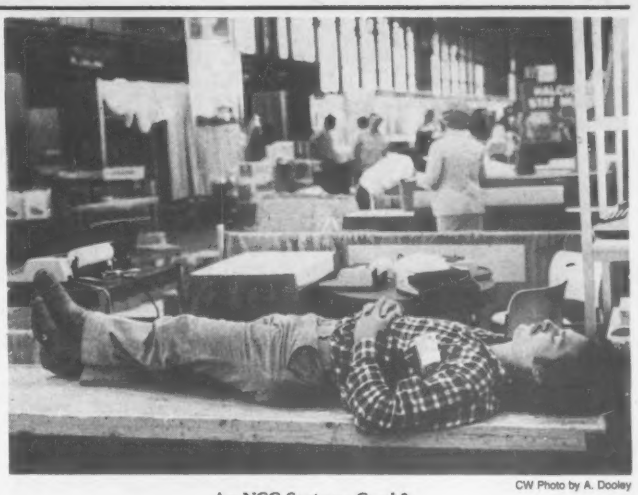
• Differences exist between the Blue Book specification and the 802 local-area network standard being developed by the Institute of Electronic and Electrical Engineers (IEEE). The two efforts are working toward convergence, but total agreement will not occur until after this summer, when the 802 committee is scheduled to publish the final version of its initial local-area network standard.

• Interconnection of Ethernet with networks utilizing other protocols — such as X.25 — are technically possible, but all three speakers declined to comment on whether or when these enhancements would become available.

• The Blue Book specification implements the lowest two levels of communication needed to support information interchange between and among users tied to an Ethernet system. A total of seven levels will ultimately have to be standardized.

CW at NCC

The two levels in the Blue Book correspond to the physical and data link levels of the International Standards Organization (ISO) open systems interconnection model. Xerox has published specifications for a third, network layer which supports interconnection between physically separate Ethernet systems. This level is one part of ISO's Level 3.



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An NCC Systems Crash?

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Triples VAX Benchmark Rate

SEL Brings Out 'Most Powerful' 32-Bit Mini

By Susan Coleman
Special to CW

CHICAGO — A 32-bit minicomputer that reportedly benchmarks at three times the rate of the Digital Equipment Corp. VAX-11/780 was claimed by its designer to be the most powerful minicomputer in the world when it was announced here at the National Computer conference last week.

Systems Engineering Laboratories, Inc. (SEL), a subsidiary of Gould, Inc. will deliver the first Concept 32/87 next month.

Bill Ward, director of advanced development at SEL and the leader of the two-and-one-half-year project that produced the 32/87, said the machine had merged mainframe concepts of emitter-coupled logic (ECL) and large machine architecture with minicomputer economy.

The result is the top-of-the-range 32/87, which for around $250,000, configured, delivers 3.6 millions of instructions per second (Mips).

Ward, who was instrumental in the design of NCR Corp.'s Criterion mainframe, said the 32/87 was developed after pressure from SEL customers, in such areas as seismic processing and power control. These customers demanded a machine that combined the capabilities of scientific number crunchers like the Control Data Corp. Cyber series with minicomputer prices, he said.

The system is software-compatible with the other machines in the SEL range. When benchmarked in Fortran, the 32/87 achieved 3,600 Whetstones per second (Whetstones are used to rate scientific processing) compared with the VAX-11/780 at 1,200 Whetstones per second.

Against a CDC 6600, the 32/87 showed equal performance — slightly under the performance of a Cyber 175, Ward said.

The machine, like others in the SEL range of 32-bit minicomputers, features the Selbus, "a very high-performance multiplexed bus." This enables it to pass data at sufficiently high rates to satisfy the huge number-crunching capacity of the central processor and its assistant array processor, he continued.

Four-Stage Pipeline

A four-stage pipeline enables four instructions to be executed at once, and the bit rate to cache memory is 90%, Ward said.

The 32/87 was microprogrammed via writable control store which, being loaded from floppy disk, enables updates to the system to be made. Earlier systems required firmware to be replaced.

The company is expected to announce very high-performance CAM computer-aided design and computer-aided manufacturing software for the 32/87 in August. SEL has five 32/87s on order and expects to initially manufacture 40 each year, Ward said.

Prices start at $235,000 for a basic 32/87 system with 1M-byte of memory, 16K-byte cache, integral single- and double-precision floating point processor, diagnostic processor, input/output processor, two floppy disk drives, CRT control console, dual-width cabinet, power supplies, firmware and diagnostics and complete documentation, the firm said. A similar configuration with 32K bytes of cache memory is priced at $265,000.

SEL's new processor uses a software-transparent hierarchical memory system provided by Integrated Memory Modules, pioneered on the Concept 32/27, and an associative cache memory of either 16K-byte- or 32K-byte-capacity.

"This design is consistent with System's philosophy of modular performance enhancements," Ward said. The cache memory system was designed to provide the performance and throughput required for SEL's traditional and new markets.

"The Concept 32/87 runs System's MPX-32 operating system and offers full upward compatability to the System's minicomputer user who wants to increase his computer performance and systems throughout without sacrificing his application software investment," Ward continued.

SEL reportedly offers diagnostic and maintenance support spearheaded by a diagnostic processor — allowing system diagnosis and troubleshooting. The microdiagnostics are loaded through a dedicated floppy disk, which is included in the basic system. Diagnostic messages are displayed on the CRT console, which is also used to display the normal control panel functions, the firm said.

The cabinet is 55.5 in. high, and has an improved cooling system. Since air is taken in and exhausted through the front and rear of the cabinet, it reportedly can be installed side-by-side with compatible peripheral cabinets.

BAS Unwraps Operating System

By Lois Paul
CW Staff

CHICAGO — Business Application Systems, Inc. (BAS) unveiled at the National Computer Conference here last week its machine-independent operating system that it designed to "free software users from the tyranny of hardware vendors," Earl Gilmore, president of BAS, said.

Basport, as the product is called, provides language capability, file structure and programming tools to build and support an interactive commercial application, Gilmore explained. He added that it provides "big-machine" features such as 32-bit address space and multiprogramming.

Major components of Basport include Basport Business Pascal, standard Pascal with extensions that reportedly facilitate commercial applications; a Basic Command Processor that is the primary user interface to the system; a debugger that can be used with Business Pascal and Cobol; a text editor; and a file system.

Utilities include a text formatter; Forms, a dictionary-driven information management system; and report and query capabilities.

Gilmore explained that programs compiled on a Basport system are portable at the object-code level. They can be transported from one Basport machine to another without being recompiled.

"It can run on anything," Gilmore said. "Users can select the machine based on what they want to do. The only difference from processor to processor is the time it takes to complete an application."

The Basport system has been in the development process for a number of years. "We have been working on machine-independent software since 1977," Gilmore said.

Basport is a full software environment for a minicomputer or microcomputer. "It can be viewed as all the software you need to be a legitimate commercial organization," Gilmore said.

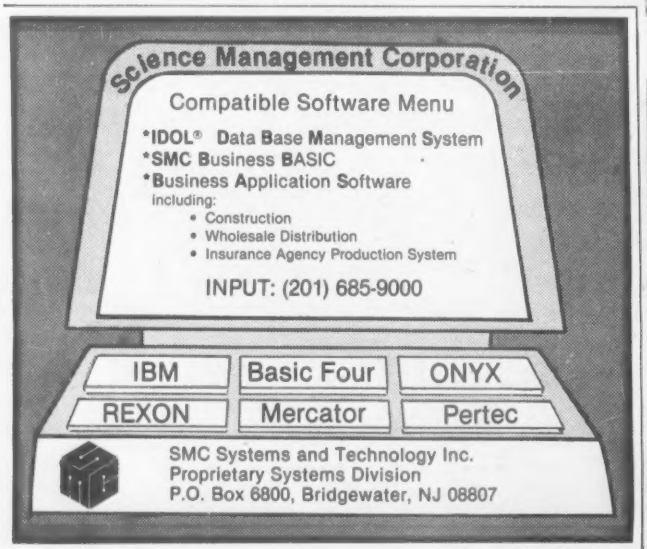
The Basport system was designed with the end user in mind, Gilmore stressed. "He can learn the system once. This is for the person who is tired of hardware manufacturers continually changing the world under him."

Users can gradually and linearly add applications to the system, Gilmore said, noting that BAS will be converting its application software to the machine-independent Basport software base.

"We will be selling vertical market packages to end users and distributors," he added.

Gilmore sees Basport as potentially filling the gap that exists between the introduction of new hardware and the availability of good compatible software.

"The public is starving for software for low cost processors," Gilmore said. Basport is available to end users for prices ranging from $3,000 to $10,000. BAS is located at 7334 Chapel Hill Road, Raleigh, N.C. 27607.



CW Photo by A. Dooley

Bob Romney (seated) put equipment from Houston Instruments, Inc. through its paces for exhibit floor visitors.

Graphics Offerings Show True Colors at NCC

By Jeffry Beeler
CW West Coast Bureau

CHICAGO — This year's National Computer Conference may go down in history as one of the most colorful shows in recent memory. But NCC '81 held here last week showed its true colors, not in its exhibitors' eye-catching product displays or slightly outrageous sales pitches, but in the variety of hues and shades emanating from the show floor's terminals and printers.

Perhaps no other conference in NCC's nine-year history has boasted such a wide assortment of color graphics exhibitors and exhibits.

NCC '81 attracted color graphics companies of nearly every stripe, from IBM with its Model 3279 terminal — introduced at last year's show in Anaheim, Calif. — to Atari, Inc., which displayed an education system featuring multicolored CRT output.

Even suppliers of color graphics software got into the act, with firms like Integrated Software Systems Corp. (Issco) busily putting their products through their paces.

Color Spectrum

Rounding out the spectrum of color graphics exhibitors were vendors like California Computer Products, Inc. with its Graphics 7 system; Chromatics, Inc., which displayed its CGC 7900 and CG series stand-alone processors; Intelligent Systems Corp. with its line of color CRT terminals; and Megatek Corp., which showed its Whizzard family of faster display units.

The line-up of color graphics suppliers might have been even more impressive if some of the industry's leading display system manufacturers like Ramtek Corp. had not elected to forego this year's NCC.

Many of the exhibitors on hand for the conference's 1981 installment agreed that the large turnout of color graphics firms reflected growing user interest in — and demand for — multicolored business output in pictorial form.

Only a short while ago, color graphics capabilities were geared primarily to fairly simple applications like imaging and the production of bar charts, pie charts and other routine business drawings. In short, the color graphics field was limited mainly to passive reporting.

But with recent advances in raster-scan techniques, the color graphics field is beginning to expand into increasingly sophisticated applications in both the business and technical realms, according to Megatek vice-president Peter Shaw.

Although color graphics is still used heavily for converting management information from tabular to pictorial form, the display technology is increasingly being harnessed to do interactive line drawings, which demand a higher level of product sophistication than simple reporting applications.

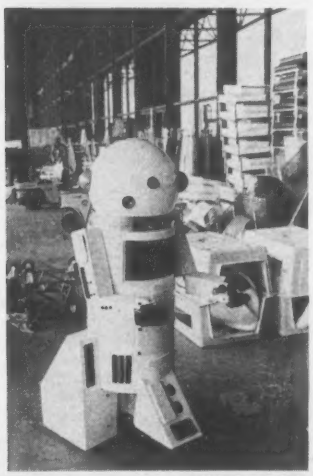
In the business sphere, interactive line drawings are allowing users to answer "what if" questions and to tackle complex financial modeling, simulation and planning applications that until recently lay beyond the capabilities of color graphics technology. The rise of interactive color graphics is also having a similar impact on the world of computer-aided manufacturing and design, Shaw said.

CW at NCC

Among users of noninteractive graphics systems, demand is steadily growing for improved display resolution and aesthetics, according to Issco's vice-president of development Anders Vinberg. That demand is particularly pronounced among nontechnical business executives, who have long been accustomed to visually pleasing charts and graphs and are reluctant to accept anything else.

In the early days, color graphics companies were so preoccupied with mastering the technological "basics" of their field that they had little time to worry about whether their screen displays or hard-copy output looked professional and presentable.

But now that the technological groundwork of the color graphics business has finally been laid, vendors can now afford to turn their attention to the artistic niceties that contribute little to information content but that enhance computer output's visual appeal and user acceptance, Vinberg said.



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Conference visitor waits to be beamed onto exhibit floor.

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"IT PAYS TO HAVE THE RIGHT CONNECTIONS"

No Big Product Splashes at This Year's Show

(Continued from Page 1)

chitecture (SNA) and the X.25 communications protocol SNA does not support domestically.

The DG software products that comprise this Xodiac revision make DG's flagship 32-bit system, the MV/8000, a direct competitor with IBM's 8100 and certain 4300 systems in decentralized, IBM-hosted data networks. Moreover, this software makes DG Eclipse minicomputer systems plug-compatible with IBM 3274 and 3276 cluster controllers, and certain DG printers and terminals plug-compatible with IBM counterparts.

Another major announcement made to coincide with NCC coverage was Xerox Corp.'s unveiling of the Star workstation for integrated data/word communications in the Ethernet local network Xerox developed jointly with DEC and Intel Corp. The basic Star features a 192K-byte 16-bit main memory and 10M bytes of disk storage.

Zilog, Inc. chose NCC to announce its Distributed Commercial Systems (DCS) series to go with its Z-Net local network architecture. This would seem to quash rumors, vigorously denied by Zilog earlier this year, that the Exxon Corp. subsidiary means to pull out of the small systems arena. DCS are based on Zilog's MCZ-2 microcomputers and support multiuser Cobol applications.

Intel recently revealed plans to market controllers and other devices for Ethernet environments and, at NCC, introduced its IMMX 800 Multibus message exchange, a software package intended to simplify multiprocessing and message flow under the protocols of Ethernet and IBM.

Software Products

Everyone had plenty of new software to consider at the conference. Cincom Systems, Inc. announced that various data base products, such as the Cincinnati firm's data dictionary, can now run as an integrated IBM-compatible system.

Harris Corp. rigged its 1600 series remote batch terminals for SNA duty with the vendor's new 377X/SNA emulator. And Harris also picked NCC to give 1600s interactive Ansi 1974 Cobol.

Microdata Corp. unveiled the Results Job Accounting Application System and Ad Pak, a software package for advertising agencies. And Zenith Data Systems announced four software packages oriented toward office applications.

On the communications front, Paradyne Corp. announced a 16K bit/sec voiceband modem. Although this would outperform the two fastest commercial voiceband modems — Paradyne's MP 14.4 and Codex Corp.'s SP 14.4 — the new speed demon is "essentially a military box" and will see initial service as a digitized voice, not data, device.

Paradyne also added a network control system, the Network Administrator, to its Analysis product family, and the TC 9600 modem, which the Paradyne spokesman claimed is now the least expensive point-to-point 9,600 bit/sec modem. It costs $2,740, including a year's parts and labor warranty.

Televideo Systems, Inc., a company noted for its CRT terminals, unwrapped a family of small business systems that range from a single-user computer to a 16-user distributed network. The Systems I, II, III feature 64K bytes of random-access memory and up to 70.5M bytes of hard disk storage. The systems use a multiuser operating system developed by the firm, and a variety of languages including Basic-80 and PL/I-80.

The Televideo systems range in price from $3,995 to $19,995, with additional user stations for the high-end system priced at $1,795.

Not one to be left out of the crowd, Altos Computer Systems unveiled a multiuser computer system that combines 10M bytes of hard disk storage with floppy disk or magnetic tape backup media.

The ACS8000-10 is reportedly the first multiuser, 8-in. 10M-byte hard disk microcomputer system to enter the crowded small business market. The Z80-based system integrates the company's single-board computer and DMA controller with a Winchester drive. It has 208K bytes of internal random-access memory, six programmable ports and can handle data rates up to 800 bit/sec, a spokesman said. The system costs about $8,500 with a single-sided floppy disk or $9,500 with a double-sided floppy disk. The computer is also available with a magnetic tape cassette, which boosts the cost to $10,990, Altos said.

Peripherals Unveiled

On the peripherals side:

- Braegen Corp. unveiled a 15-in. version of the Digital Equipment Corp. VT-100 terminal called the BT-100. The terminal features advanced video and a printer port as standard features and costs $1,995.
- Ampex Corp. introduced a line of CRT terminals that have a touch input capability. The units use a scanning infrared beam technology and allow the user to interact with the host computer. The Dialogue Touchterm 80 has an RS-232C asynchronous interface, operates at transmission rates up to 19.2K bit/sec and costs $2,498.

Other peripherals that made their grand debut at the show are: a number of printers by General Electric Co., including a Terminet 200 split-platen line model that operates at 9,600 bit/sec and prints at 200 char./sec and a 1,200 bit/sec Terminet tabletop matrix printer that features dual microprocessors and prints bidirectionally at 120 char./sec.

CW Photos by J. Kirchner

Some NCC visitors had to get a closer look at things.

Teachers Tell How to Push Use of Micros in Schools

By Susan Blakeney
CW Staff

CHICAGO — There seem to be two kinds of teachers: those who support computer-aided instruction (CAI) and those who do not. And the first group is battling to convert the second.

That was the thrust of a session called "Teachers' Experience with Microcomputers" held at the National Computer Conference's Personal Computing Festival here last week. The eight-member panel from various Illinois school districts represented that first group of teachers.

Jerry Wicks, coordinator of a CAI program in Northbrook, Ill., recommended what he called the "back-door" approach. Computers should not be imposed on teachers from administrators on high, but instead should be brought into the lower levels and introduced to the classroom teachers first, he said.

Also, rather than forcing programming down the teachers' throats, Wicks encouraged a computer literacy program instead.

Demands on Students

Sandra Bode from the DuPage Career Center advocated the use of computers in the classroom because of society's increasing demand on the student to know information processing. Now, she claimed, computers are very much like "the video machines that sat in the corner of the room because teachers were afraid to use them," but that is changing fast.

In many classrooms, Tandy Corp.'s TRS-80 and Apple Computer, Inc.'s Apple micros are an integral part of the curriculum in kindergarten through 12th grade, despite the sizable obstacles of cost and attitude.

Disappointed by the considerable downtime of the large mainframes, several administrators have turned to micros as a kind of dual solution for office use and classroom applications, session participants said.

Thus, computers are finding their way into the music room, the typing class, the English courses and, of course, the math department. Not surprisingly, most students are more responsive to them than many instructors.

Attack Plan

Jim Dollinger of Naperville, Ill., embraced this phenomenon as part of his "very definite attack" on his school district because once the teachers and administrators see the students' enthusiastic reaction, it seems to spread.

Dollinger suggested that in drumming up support for CAI, one should draw upon all the resources in and around the community. Ask for surplus equipment to lessen the costs, he told session attendees.

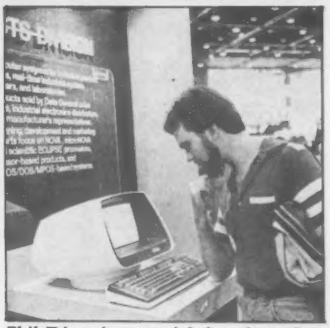
Other advice to teachers who are just beginning to wage their own CAI war included:

- Do not emphasize the use of computer games in the classroom — administrators will not like it.
- Stress the number of jobs now available in the DP field.
- Stay away from disk and use tape instead — it is sturdier with children.

Northbrook's Jerry Wicks has successfully built up his "Apple orchard" in spite of barriers and criticism. Judy Kralik of Woodridge, too, has overcome arguments that a declining literacy rate in this country must not supercede the need for CAI but, rather, that CAI should be employed to reverse this trend.

Looking at the Computer-Based Writing on the Wall at Atari's Booth

Working Their Way to the Top



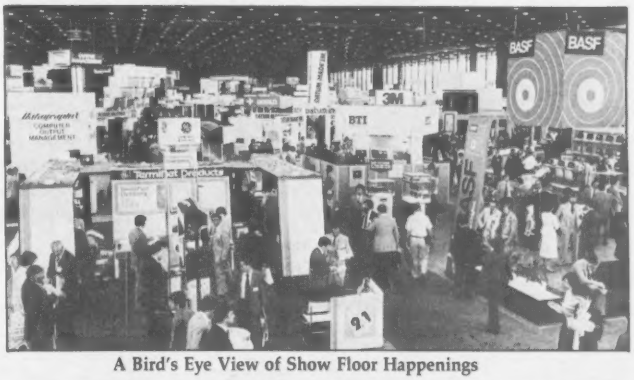
Phil Trice gives careful thought to Data General Corp.'s new Dasher G300.

NCC '81

A CW Photo Feature
By Ann Dooley

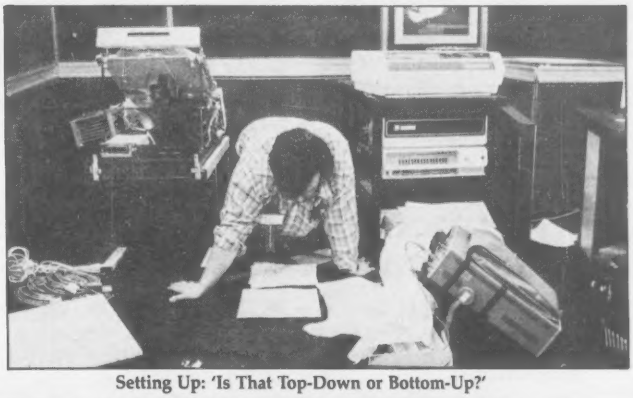
Anselme Pachel (left) displays terminal at Epson booth.

Paul Hoffman wears a black armband to show his reaction to Illinois' vote against the ERA.



A Bird's Eye View of Show Floor Happenings

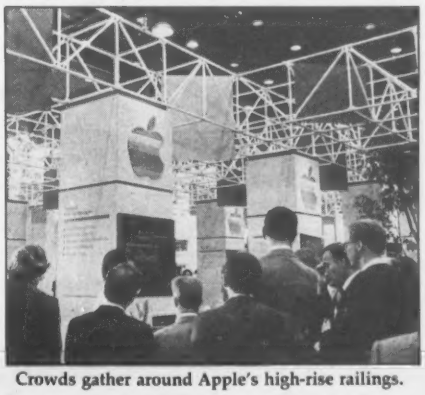
Wang's Rob Peyton is on the keyboards.



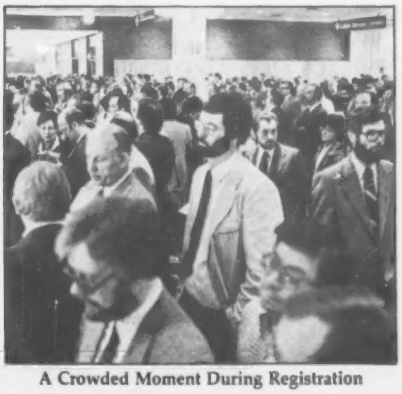
Setting Up: 'Is That Top-Down or Bottom-Up?'

Hyman Speck pauses to catch up on the Daily news.

Hands Across the Water at American Computer Group's Booth



Crowds gather around Apple's high-rise railings.



A Crowded Moment During Registration

CW Photo by A. Dooley

'Do you follow me so far?'

NCCers Get Opportunity To Weigh Pros and Cons Of ACM, DPMA Curricula

CHICAGO — The American Federation of Information Processing Societies, Inc. (Afips) is many things to many people. But can two of its bodies — Association for Computing Machinery (ACM) and Data Processing Management Association (DPMA) — be the same thing to the same people?

This was the subject of the session, "A Survey and Comparison of Model Curricula for Information Systems Education" last week at the National Computer Conference.

Thomas H. Athey of California State Polytechnic University, Pomona, spoke on behalf of the newly proposed Computer Information Systems (CIS) curriculum proposed by DPMA.

CW at NCC

DPMA is challenging the information systems curriculum developed by ACM that has been in existence for more than 12 years. Jay F. Nunamaker Jr., who teaches at the University of Arizona, explained the origin of the ACM curriculum and mentioned that it is being revised once again to keep pace with changing educational and corporate needs.

DPMA seems interested in a slightly different educational emphasis — application program development. This is in contrast with ACM's analyst/design emphasis..

Athey explained that the DPMA program is heavily committed to structural methods, but did not advocate a specific methodology. Nunamaker, on the other hand, said the ACM program rested on the conceptual foundations for building a corporate information system.

Both Ather and Nunamaker emphasized that their students gained an applied, real-world education which would allow them to become quickly productive in an organization.

DPMA's core undergraduate curriculum was composed of the following courses:

- Introduction to Computer-Based Systems.
- Applications Program Development I.
- Applications Program Development II.
- Systems Analysis Methods.
- Structured Systems Analysis and Design.
- Data Base Program Development.
- Applied Software Development Project.

The ACM Curriculum Committee for Information Systems, on the other hand, had identified a number of core courses in information systems analysis, data base, software design, system design and implementation, file systems, data management and data communication.

Neither DPMA nor ACM found a consensus on what language should be taught, although both agreed that one should be specified by the school. In one survey DPMA conducted, 93% of the respondents indicated a preference for Cobol.

Walter J. Hadcock, speaker from the A.O. Smith Corp., said he felt the DPMA curriculum produced a more "immediately useful graduate," while ACM's curriculum might be better for "mid-term and long-term goals."

Fifty-two schools now meet ACM requirements in their undergraduate curriculum. DPMA claims some 20 unidentified institutions will try out their curriculum.

Most schools take several years in committee to approve a change in curriculum. The needs and interests in data processing are changing, sometimes daily, further complicating the development of curriculum standards.

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Birmingham, AL	June 9
Boston, MA	May 12
Buffalo, NY	May 20
Calgary, Canada	June 22
Charlotte, NC	June 9
Chattanooga, TN	May 19
Chicago, IL	May 20
Cincinnati, OH	June 10
Cleveland, OH	May 21
Columbus, OH	June 10
Dallas, TX	April 28
Denver, CO	July 8
Des Moines, IA	May 22
Detroit, MI	May 22
Ft. Lauderdale, FL	April 29
Greensboro, NC	May 12
Hartford, CT	May 20
Harrisburg, PA	April 15
Houston, TX	April 22
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Opportunity Sighted in Software Maintenance

By Tom Henkel
CW Staff

CHICAGO — The programmer's graveyard is alive with opportunities.

Software maintenance, long regarded as one of the true drudge jobs of programming, may find new life, according to John Reutter III representing Dynabyte, Inc. Reutter said that as costly as software is, maintenance is 40% more costly. He theorized the average data processing shop spends 30% of its development budget on programs and another 70% to keep them running.

With those figures in mind, Reutter told a standing-room-only crowd at the National Computer Conference here last week that the future of software maintenance is taking a giant step forward in overall shop importance.

And software maintenance no longer means just debugging. Reutter said coding and emergency repairs amount only to about 10% of a maintenance programmer's duties. Most of the maintenance programmer's time (about 45%) is spent making enhancements to existing systems. Another 25% is spent keeping up with changing conditions or the way the business is handled, and about 12% of the time is spent on upgrades or recoding to adapt to hardware upgrades. The final 10% is devoted to growth or expanding the existing system to accommodate a higher demand, Reutter said.

Speaking in favor of a structured methodology of software maintenance, Reutter said the maintenance programmer should have four basic goals in mind.

He should be dedicated to correcting and improving the programs, smoothing out both hardware and software changes and improving the overall quality of the shop's software and be able to produce enough maintenance-type services to keep in step with the development activities.

But aside from the idyllic view of what a maintenance programmer should be, Reutter said there are some clear areas developing in maintenance that are becoming increasingly important. Job classifications like performance measurement, run-time error decting, program strength analysis managing reference facilities are jobs that will increase in popularity. Ultimately the financial rewards associated with those jobs are projected to increase, Reutter said.

Attacking the thesis that maintenance programming is a dead-end job that does not allow the programmer to grow, Reutter said more programs are enhanced into bigger, and potentially better, programs than are projects that are started from scratch.

Speaking in defense of Reutter's thesis, Michael J. Lyons of the Catalyst Corp. said on a conservative scale, each line of code costs an estimated $10 to write. Therefore, it makes much more sense to upgrade current software packages, as opposed to developing new programs from scratch.

To further sweeten his stance, Lyon said switching to a structured method of programming can increase programmer productivity by a three-to-one ratio. Therefore, he concluded, the combination of structured methods and a sound maintenance program could greatly improve software productivity.

CW at NCC

Japanese Focus On Software

By Tim Scannell
CW Staff

CHICAGO — Armed with notebooks, cameras and an insatiable curiosity, the Japanese were out in full force last week at the National Computer Conference.

But this year they were focusing on software and U.S. software companies, rather than on the latest hardware and technological developments.

The majority of Japanese visitors were interested mainly in the exhibits showcased on the three football field-sized floors of McCormick Place, according to Kazuhiro Ishida, a tour director who organized a group of 38 Japanese businesspeople and brought them to the show. Smiling at references to the highly publicized "Japanese invasion" and claiming that Japan is probably equal to the U.S. in hardware capabilities, he said it is painfully behind in software and software development.

As an example, Ishida pointed out that his countrymen presently have no convenient or global method to keep track of any Japanese technological breakthroughs. Therefore, while productivity is high and the technology comes fast and furious in Japan, there is also a lot of duplication of manufacturing effort.

The Japanese are studying the U.S. patent procedures and tracking methods to overcome this problem, Ishida said. "Software sales are not so popular in Japan, so there is a possibility for a lot of new business to come into the country," he explained.

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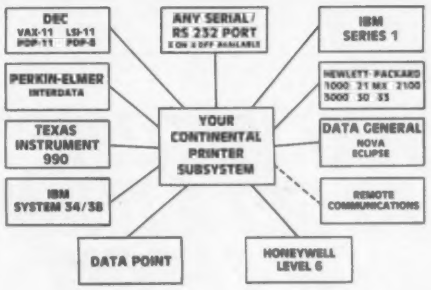

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Blumenthal Urges Industry Effort on TDF

By Marcia Blumenthal
CW Staff

CHICAGO — Burroughs Corp. Chairman W. Michael Blumenthal urged the creation of a cooperative computer industry effort to monitor and disseminate information about proposed or enacted transborder data flow legislation during his keynote address at the National Computer Conference here last week.

Blumenthal gave examples of how restrictive legislation, stemming from economic protectionism in various countries, will impact his company. Burroughs recently felt the barb of protectionism in its remote support program. The Canadian government refused to allow Burroughs to dial into the government computing system to service hardware, citing privacy as the reason for the denial.

CW at NCC

R&D Efforts

In other issues hitting close to the Detroit mainframer's turf, Blumenthal said the firm's widely scattered research and development effort could be hampered if foreign governments prohibit the transfer of information through communications networks. "This would force us to fall back on personal visits or mail unless we invent an international pony express."

Blumenthal is the second major industry executive to call for industry-wide cooperation in the past couple of months. Robert M. Price, president and chief operating officer of Control Data Corp., recently suggested a framework for joint microelectronics research [CW April 13].

CW Photo by A. Dooley

W. Michael Blumenthal

However, when asked whether Burroughs would spearhead such an effort, Blumenthal said the TDF Forum should be the responsibility of professional and industry organizations such as the Computer and Business Equipment Manufacturers Association (Cbema).

Blumenthal also called for joint ventures with other countries as a means of allaying foreign countries' concern with U.S. dominance in the information processing industry. "Protectionist barriers will not fall until other countries feel they are not threatened by the American information gap. We must temper our frustration over these barriers with the awareness that, in other industries, it is the Americans who raise the barriers of protectionism."

It is not hard to see why foreign nations are concerned about U.S. dominance in the information processing industry when 56% of the large data bases for service networks are located in the U.S.; and these data bases account for more than 80% of worldwide transmissions, Blumenthal said, citing statistics from the Organization of Economic Cooperation and Development (OECD).

Burroughs is actively exploring a joint venture arrangement, but Blumenthal would not comment on the nature of any proposed venture or with what countries that type of arrangement is being discussed.

European Economic Community officials recently called for joint ventures and cooperative agreements among European DP firms to develop the equipment for a European advanced telecommunications network, he noted. "If this plan works, the Europeans will control not only the type of information transmitted but the media over which it is sent," he said.

Although transborder data flow restrictions are imposed by nations in the guise of enforcing privacy laws, European nations define privacy much more broadly than the U.S. government. European nations fold within the privacy net entities such as multinational corporations, which permits a country to regulate industrial, financial and commercial information as well as personal data.

Differences in the definitions of privacy create different privacy legislation among nations. The Europeans, outside the OECD, have adopted a binding treaty within the Council of Europe, Blumenthal said. This treaty allows a country with national privacy legislation to restrict data flow only to countries where no equivalent legislation exists.

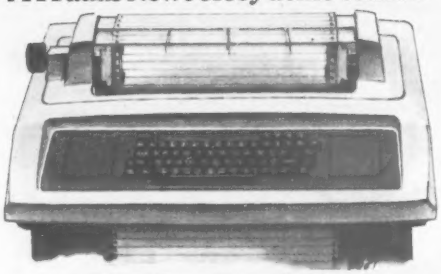
Xerox's Star Takes Starring Role at NCC

CHICAGO — On the third day of the National Computer Conference here last week the exhibit that looked like a sure-fire winner from the start — Xerox Corp.'s Star 8010 professional workstation — turned out to be just that.

Between 150 and 200 visitors per hour passed through the Xerox booth, estimated George Kingston, marketing manager with Xerox's Office Products Division.

Visitors ranged from curious spectators to interested potential users, according to Kingston.

MTI adds New Jersey demo center!



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Reusable Code Prescribed For Software Productivity

By Lois Paul
CW Staff

CHICAGO – If we define application software productivity as the amount of effort required to produce the software needed, then the larger the amount of reusable code, the higher the productivity, Daniel Teichroew of the University of Michigan said in a panel discussion at the National Computer Conference held here last week.

At the session "Definition and Measurement of Application Software Productivity," Teichroew cited the large number of tools available that can add up to increased productivity. These include data dictionaries, programmer workbenches, computer-aided design and workstations. The more effectively these tools are integrated, the more effective they will be in increasing application software productivity.

According to Teichroew, many organizations wait until "the 365th day of the year" to look at the problem of productivity. Benn Konsynski of the University of Arizona, session chairman, stressed the importance of identifying and removing unproductive practices, then making decisions regarding objectives of productivity and setting up monitoring capabilities.

IBM Project

At IBM's Research Center in San Jose, Calif., five researchers, including speakers Eric Carlson and Stephen Zilles, went through this process four years ago. They began by reviewing mostly unpublished IBM studies of application development productivity.

They found that the methods of measuring productivity, whether by number of lines of code generated or man-days required, do not matter as long as ratios of input and output are used and these are consistent.

It also became obvious that application development productivity will not change as long as the high cost of and need for maintenance programming remains. Application productivity will not improve until there is more support for the early stages, including the ability to reuse instead of reinvent code, Carlson said.

The studies also revealed that application development productivity was less for interactive programs than batch programs, he said, pointing to the need for improved tools in this area.

Modularization of software applications does not necessarily lead to increased productivity, Carlson continued, adding that the process of factoring is better and more effective.

Factoring, which was developed at IBM's Research Group as a result of the study of productivity, is a method of "factoring out" blocks or pieces of code which are independent of the application of the program and therefore are reusable, Zilles said.

Richard Harris, manager of advanced corporate systems for Xerox Corp., said his company began trying to measure productivity in 1974. At the same time, Xerox was interested in looking at tools and techniques to increase productivity; its data dictionary and precompiler resulted from this process.

"We know there are things you can do which can increase your productivity because this is provable in our own experience within the company," Harris said.

Those groups within Xerox that had the highest productivity had a mature

CW at NCC

data base environment, a strong data base administration function, heavy use of the data dictionary and precompiler and on-line programming.

Konsynski noted that the ultimate measure of productivity is how much of an impact is made on the user's productivity. "We are tool builders building tools for tool builders."

CW Photo by A. Dooley

Lear Siegler railroaded attendees into its booth.

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Six 'pioneers' who helped develop the first production model of Univac I reminisced recently before a mock-up of that CPU, which was displayed at NCC. Inspecting original program records and circuit components were (left to right) Cedric Lee, A.B. Tonik, Jean G. Smith, Neil MacMillan, Arthur Gehring and Oscar B. Hobb.

Pioneer Day—Misty Eyes, Laughs, Standing Ovation

By Marguerite Zientara
CW Staff

CHICAGO – Take eight computer pioneers, an audience of 500 and Dr. Carl Hammer as emcee, mix well and what do you get? Two National Computer Conference sessions that saw plenty of laughter, some misty eyes, one standing ovation and the presentation of a huge brass plaque during NCC's Pioneer Day celebration held here last week.

The standing ovation was accorded the indomitable Dr. Grace Murray Hopper, one of the developers of Cobol, after an articulate and entertaining speech describing the early work on Univac I, the first commercial computer.

And the brass plaque was presented by Hammer to Daniel B. Levine, deputy director and acting director of the U.S. Census Bureau, the first Univac I user. The plaque, signed by officers of the American Federation of Information Processing Societies, cited the improved "quality of life for all people" that has resulted indirectly from the bureau's placement of its fateful order for Univac I.

The first session of the afternoon featured four pioneers who discussed their seminal work on the machine, including internal developments and the image they planned to create with the Univac I data processing system.

Present besides Hopper were J. Presper Eckert of the original Eckert-Mauchly team, now vice-president of Sperry Univac; T.H. Bonn, director of the computer research laboratory at the Sperry Research Center in Sudbury, Mass., who discussed hardware developments of the system; and Erwin Tomashi, chairman of the board of Dataproducts Corp. and founder of the Charles Babbage Institute, who recalled the marketing of Univac I.

Session Two was dedicated to the outside world's perception of the Univac I and featured the following speakers: Dr. Mina Rees, president emeritus of City University of New York, who was in charge of the committee that selected Univac I for three government organizations; Arthur C. Nielsen Jr., chairman of A.C. Nielsen & Co., the firm that *almost* bought the first Univac I; and CBS news correspondent Charles Collingwood, who was on hand for the first computer-aided presidential election projection in 1952.

Also speaking at the second session were Levine and Dr. Henry Tropp of the department of computer science at the University of San Francisco, who gave a brief historical summary of the events of 30 years ago.

A Few Vignettes

The following vignettes represent only a few of the many fascinating thought-provoking tales that these pioneers had to tell:

- Eckert: "I'm often asked if I anticipated what the future held after the development of Univac I. Of course I didn't. I foresaw some of the events, but it all happened much faster than I expected. Who could have imagined that the development of the integrated circuit would follow so soon after the invention of the computer?"
- Hopper: Arising from the early need to copy code from each other's notebooks, "one of our startling discoveries was that programmers cannot copy things and programmers cannot add." The knowledge led to the development of the first compiler so the computer could take care of such tedious tasks.
- Hopper: "Betty [Holberton of the National Bureau of Standards] taught me to draw flowcharts, and I really wish we hadn't moved away from flowcharts. In multicomputer systems it is very important to know the structure of our systems so that we can indicate it to others."
- Hopper: "There is one great danger in computing today, and that is the phrase, 'But we've always done it that way.' If anyone here utters that phrase in the next year, I promise I'll instantly materialize beside you and haunt you for 24 hours and try to get you to change your mind."
- Tomash: "The Univac I took 50 tons and 50 kilowatts of power to install. It was done on a Saturday so the street could be closed to traffic; a crane was mounted on the top of the building and it was hoisted from the street. Not just a window, but a whole section of the building was removed to allow the transfer."

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Spotting Flaws Early Seen Quality Assurance's Aim

By Phil Hirsch
CW Washington Bureau

CHICAGO — Of all the design flaws that occur in software development projects, 60% to 70% appear during the requirements analysis phase, when they can be fixed at minimal cost. Therefore, it is crucially important to have a quality assurance/review program that can spot these problems immediately.

So said Wayne Smith, director of quality assurance and business systems at Applied Information Development, Inc., Oak Brook, Ill., a custom programming firm. He was among the participants in a series of National Computer Conference sessions last week on implementation of DP-related technology transfer. As defined by the session chairman — Denny O. Wallace, of Illinois Tool Works, Inc. — the discussion covered implementation of hardware and/or software technology new to the implementing organization.

Smith illustrated the benefits of a quality assurance program by pointing out that an error which occurs during the requirements analysis phase of a software development project typically costs about $1 to fix, but if the error isn't corrected until the end of the project, this cost rises to $300 to $400.

Key Elements

Key elements of a successful quality assurance program, he added, include:

- Centralization of responsibility.
- Clearly stated implementation procedures which are made part of the project's day-to-day operating routine, and which have a clear relationship to cost/benefits.
- Sharing of responsibility for success of the project between the quality assurance representative and the project manager.
- The quality assurance/review program must provide data that is useful to the project management staff; it must not be simply an auditing process, Smith added. Also, there must be regular review of progress in relation to original goals.

At Smith's company, a checklist has been developed covering all phases of the software development process. It consists of questions which the project manager answers at frequent intervals. The answers are scored and the project is then placed in one of four categories. At the top of this hierarchy are those projects which have a high probability of meeting their goals; at the bottom, those which havee encountered "substantial problems."

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Careful selection of quality assurance personnel is another key consideration. Smith suggested choosing senior analysts with project management experience rather than young technicians. Those selected should "know enough about the technology not to get snowed," he added. Tact, analytical ability and inquisitiveness are other desirable traits.

Microdata Corp. doubled up at NCC.

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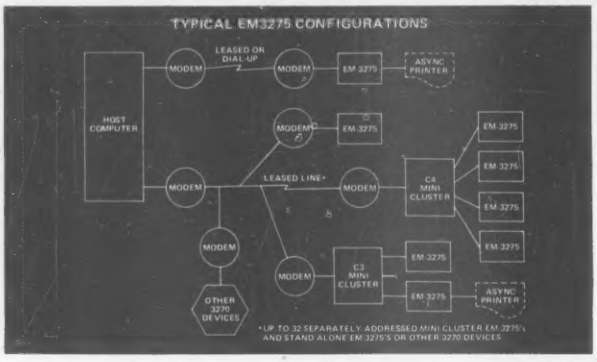

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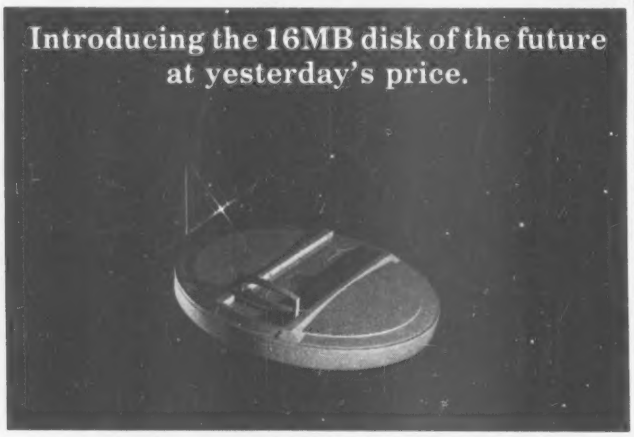

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Getting lunch at NCC often meant a long day's knight.

Capacity Planning Called Management Issue

By Tom Henkel
CW Staff

CHICAGO — Theorists may derive mathematical formulas for producing a snapshot of how much of a processor is actually being used, but the decision to buy hardware is a management decision.

So while mathematical formulas and complex technical methods used to evaluate processor performance are quite important to the capacity planning issue, they are not the *only* issue, according to Leonard D. Lipner of BGS Systems, Inc., in Waltham, Mass.

Lipner told attendees at a National Computer Conference session last week on the management issues in capacity planning that other important issues fall within the realm of the management function. Those issues include how to insure that work load forecasts are accurate, how to organize the DP facility for maximum resource utilization and how to oversee the computing process.

Early Days

In the early days of computing, the notion of capacity planning was a relatively simple thing to deal with. When it looked like there was too much work for an existing computer system, the vendor was called in to upgrade or replace the system. Things have changed dramatically in the past 20 years, and many more decisions now go into the capacity planning process.

There are, for example, more vendors on the scene offering a variety of minicomputers, microcomputers, software and both in-house and out-of-house DP services.

Distributed processing also gives the manager a viable option to extend a system's capacity, according to Al Williams, a capacity planner at Mobil Oil Co. in New York.

Information processing services take more and more of most firms' profits each year. Thus managers have to make the right decisions and be able to justify them. "Mistakes are more costly and easier to make," Williams said, noting that the expansion of the computing services business poses the highest potential for errors in system expansion decisions.

"Computing services now impact the day to day, and even the minute-to-minute, operation of companies," Williams said. He added that management must decide when a company needs a computing service and when it is appropriate to expand the in-house computer system.

Speaking of the capacity planning program that has been in operation for the past six years at Mobil, Williams said he leaves the technical evaluations to his computer staff. The various Mobil divisions are responsible for managing their own portion of the total system, but the expenditures for system upgrades are evaluated by the New York office.

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But the Mobil system is slightly larger than average. The firm has the equivalent of 33 IBM 3033 processors. CPUs installed at Mobil range from a 4331 and two Digital Equipment Corp. Decsystem-2060 processors to seven 3033s. Other information functions, like word processing and image processing, also are governed by the capacity planning team, Williams said.

Mobil bases its capacity planning on a five-year plan, with an emphasis on the first two years. The long-term capacity plan is updated annually, and necessary changes are implemented on a one-year lead time, according to Williams.

However, the five-year plan only evaluates processors, based on monthly CPU usage figures collected each year. Peripherals are not included in the analysis until one year before a new processor, or an upgrade plan, is set to be installed. And provisions for simulations, what-if analysis and linear analysis are not included in the capacity planning outlook, Williams said.

'And This Little System Is So Fast It Comes With Matching Disk Brakes!'

Front-Office Support Urged

Technology Transfer Issues Eyed

By Bill Laberis
CW Staff

CHICAGO — The successful introduction of new computer technology to a business demands a strong managerial mandate coupled with a system of rewards for those who assist downstream in the planning and implementation.

But this front-office support cannot take the form of a unilateral management edict without running the risk of cramming the technology down the company's throat, thus sabotaging efforts to change and grow.

That was the message delivered last week by panelists in a National Computer Conference session titled "Technology Transfer — Management Issues," the first of three sessions dealing with the thorny technology transfer issue.

In addition to giving its unconditional support and guidance in introducing new technology — be it distributed data processing, structured analysis and programming or the data base approach — management must also scrutinize its own organization and decide what elements of it might impede implementation and acceptance of state-of-the art technology.

"Management must sell and support the project as aggressively as it can, not just within its own ranks, but to everyone else who will be developing and ultimately using the new system," Charles L. Gold, manager of MIS planning at IBM, said.

Bottom Line

"The bottom line is, if you went to expand fully with computerized technology you must do so with a user-friendly system," he said. "This means management must give the project a great deal of attention, involving a range of both DP and non-DP personnel in all stages of development."

Panelist John B. Belknap of Belknap Data Solutions, Ltd. said his company's recent survey of more than 800 large corporations which have introduced distributed data processing showed a consistently high level of upper management involvement in the planning process.

"In most cases non-DP people were heavily involved all the way through the various steps of implementation, although somewhat less so when it came down to vendor selection," Belknap said.

Based on some 700 phone inquiries, Belknap was able to determine that top management championed the DDP cause seven times in 10, actively supporting its introduction while avoiding running the show entirely on its own.

The survey also showed that the primary motives for introducing the new technology were an assumed need for

CW at NCC

greater user involvement plus a strong desire for management to retain centralized corporate control while reducing the load on the best mainframe.

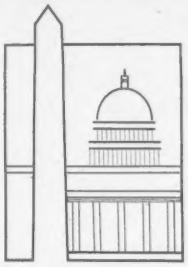
"The benefits [of successful technology transfer] were also borne out in the survey," Belknap added. "About 60% of the applications that resulted from using distributed data processing have been developed within the companies since the technology was introduced. New technology really does spurn innovation, if it is accepted."

In a presentation punctuated by his own technology transfer model, panelist J. David Benenati of Bendix Corp. likened the technology transfer path to an excursion through valleys and around hills, highlighting the pitfalls that await the ill-prepared.

"The company must take a structured approach each step of the way, with the emphasis on management sponsorship," Benenati said. "This implies taking a good look at the management structures and the environment in which the transfer is going to take place."

CW Photos by A. Dooley

Lee Grissom and Richard Spencer examine Computer Devices, Inc. equipment.



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Computing Power Seen Spreading to Populace

By Jeffry Beeler
CW West Coast Bureau

CHICAGO — Although government agencies and private corporations still control most of the world's available high technology, computing power is slowly beginning to find its way into the hands of the general populace, a National Computer Conference speaker noted here last week.

"Computers are no longer the exclusive property of large organizations," *Privacy Journal* editor and publisher Robert Ellis Smith said during an NCC program session on "Effects of Computers on Personal Life." "Increasingly, technological goodies are coming under the control of the people."

Just five years ago, Smith recalled, computing power was concentrated almost entirely in large bureaucracies

CW at NCC

and institutions rather than in the hands of the people those organizations were supposed to serve.

The Internal Revenue Service (IRS), for example, operated a large Martinsburg, W. Va., computing center for processing federal tax returns, but provided no comparable service to help taxpayers complete their 1040 forms. Likewise, police departments maintained large crime information systems, but offered no corresponding facilities to aid crime victims.

Steady Democratization

Since then, the patterns of computer use within the IRS and the police community have changed only slightly. But despite that fact, computing power is being steadily democratized, Smith said.

Smith cited examples of growing computer use by the physically handicapped and of private corporations that are increasingly allowing their employees to work from on-line terminals in the home rather than drive each morning to their offices.

Smith attributed the increasing popularization of computing partly to the rapid growth in the industry's hardware manufacturing capability.

Two years ago, he said, some four million microprocessors were produced annually. Today, the same number of components are assembled each week.

"Computer production now exceeds the number of live births, and by 1984, computer volume will be greater than the total world population," he predicted.

Handgun Argument

People who defend the increasing movement of computing into the home and into the hands of private individuals often justify their beliefs with a line of reasoning reminiscent of handgun advocates.

Such people argue for the "right to bear terminals" on the ground that personal ownership of computer equipment would help protect the public if the federal government someday decided to use high technology against its on citizens, the *Privacy Journal* editor said.

But although computers are making increasing inroads into the ranks of the common man, the trends in high-technology use are not entirely encouraging, Smith added. He cited the case of the federal Department of Human Services, which recently dusted off an old proposal to create a nationwide data bank listing every individual who had ever received a grant or loan.

Known as the National Recipients System, the proposed data bank would be the "noncriminal equivalent of the FBI's National Crime Information Center" and would affect an estimated one-third of all U.S. households, Smith said.

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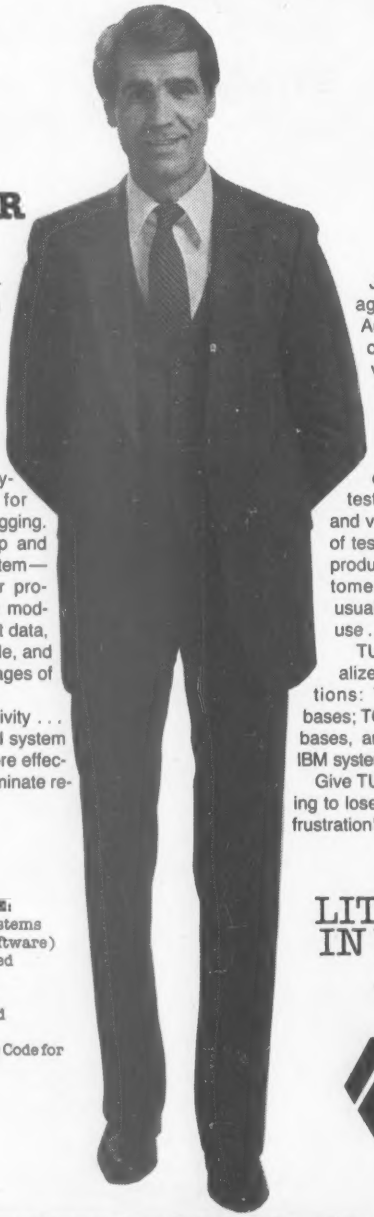

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Mainframers' Mistake

Vendors Warned of Micro Incompatibility

By Tim Scannell
CW Staff

CHICAGO — The microcomputer industry is making the same mistake the minicomputer and mainframe industries made during their early periods. One vendor's hardware is designed not to communicate with another vendor's machine, and money is being poured into software that cannot easily be transferred from one system to the next.

That was the clear warning from publisher Adam Osborne, whose keynote address on new directions for personal computers kicked off the Personal Computing Festival at the National Computer Conference here last week.

If this type of practice continues, Osborne cautioned, manufacturers will be so busy reinventing the wheel that there never will be truly low-cost computing — at least not from U.S. manufacturers. Because "if we don't do it, the Japanese or somebody else will, and we'll have nobody to blame but ourselves."

What, Where, Why

Speaking to an overflow crowd, Osborne talked about the what, where and why of the personal computing industry and noted some changes he believes will take place in the very near future. Osborne drew comparisons between the "chance, luck and happenstance" of yesterday's microcomputer development world and the Wall Street investment-glutted industry of today.

In order to get a clearer picture of where they are going and exactly where they should be, manufacturers have to pause and take a look at where they've been. Unfortunately, most companies are operating "like the guy who confused arson with incest and set fire to his sister," Osborne said.

In the past, many of the microcomputer companies were founded and run by "techies," Osborne explained. Although the hardware and software back then was relatively bad, it did have a redeeming value. It had a commonality with competing systems, which turned out to be the driving force that launched the entire industry.

Many of these early companies did not survive because they were poorly managed, he added. The "techies"

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knew how to build or package a system, but couldn't survive the business aspects of the industry.

Now, however, the tables have turned and most microcomputer manufacturers have that needed business savvy. Companies like Apple Computer, Inc., Commodore Business Machines, Inc. and Tandy Corp. brought a credibility to the industry through their good business sense, he said.

Unfortunately, these highly successful firms are ignoring the principles "that made the microcomputer industry happen in the first place," Osborne stated. In an effort to stem competition, every one of these micro giants is building systems and developing software that can't be used outside a particular vendor's domain. As a result, while the companies may survive, the momentum that has driven the whole industry has died down.

Most companies are successful because they are adequate, Osborne claimed. They've learned the IBM-authored lesson that "to be No. 1 you don't have to be the best or even be good. You just have to be adequate and well-supported."

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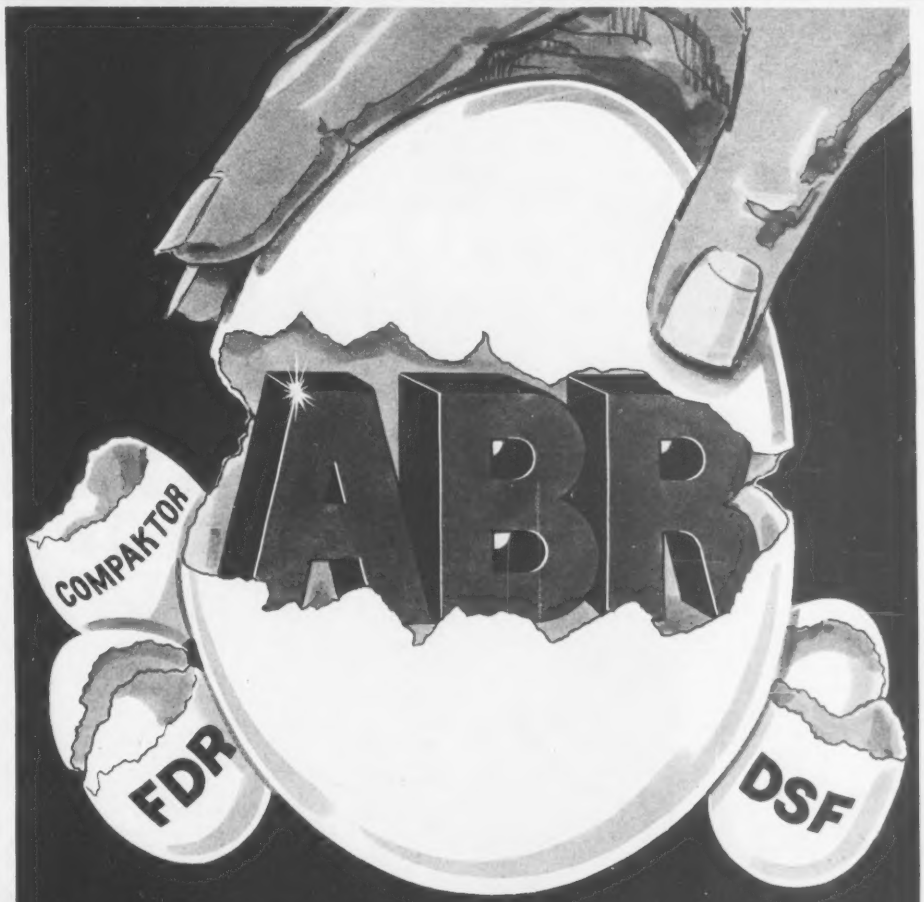

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Panel: Computers Not Creating Generation of Math 'Whiz Kids'

By Jake Kirchner
CW West Coast Bureau

CHICAGO — By exposing our children to computers in school are we creating a generation of mathematical whiz kids with no interest in artistic creativity, spontaneity or social intercourse?

"No," was the consensus at a National Computer Conference session last week. That optimistic conclusion was not unequivocal, but speakers and attendees at the "Computers and the Future of Literacy" session generally agreed children gain more than they lose through interaction with microcomputers.

The basic question was posed by Session Chairman Frederick L. Goodman of the University of Michigan, who raised questions about possibly adverse effects of "micros and their almost ubiquitous emergence in schools."

Technology, he said, "is changing what it means to be literate in some subtle and important ways." Literacy, he continued, "values imprecision and ambiguity," but computing, while not an entirely exact science, does demand increased precision.

While children need to learn the value of precision, they may overreact to the "seduction" of computers, Goodman said. If that happens, he asked, will computers constrain children's development in ways that involve some loss to society?

Finding Answers

Goodman said he does not have the answers to these questions, but suggested "highly creative people will be seduced into a definition of what it means to be creative that is highly different from what it meant in the past."

Another panelist, Lawrence B. Heilprin of the University of Maryland Computer Science Department, agreed that increased interaction with computers "diminishes the time spent in individual, personal contact" and "tends to displace traditional cultural knowledge — art, poetry, history and other 'classic' fields."

But there are important "pros" to those "cons," he said. For one, "exposure to computers heightens the sense of order in nature, of precise laws." According to Heilprin, "it emphasizes relations and their treatment in science, engineering and law, as well as in everyday business."

Other panelists and audience members argued passionately that the potential of computers to unlock childrens' creativity far outweighs any threat of forced regimentation.

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Standards Seen Needed for Data Dictionaries

By Tom Henkel
CW Staff

CHICAGO — Data dictionaries can be a boon to data base management, but they can also be a new kind of systems bottleneck. It all depends on how the dictionary is designed, and a team of researchers speaking before the National Computer Conference held here last week recommended standardization of data dictionary designs as a solution.

Data dictionaries, or information resource dictionary systems, are software facilities that keep track of resources, such as files and groups of data elements. The dictionary develops a relationship among these elements.

Michael Meyer, with Honeywell, Inc.'s McLean, Va., installation, said that in an era of rapidly declining hardware costs and soaring software expenses, software that cuts the programmer's time is an essential element of a computer system.

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Essential parts of a data processing system, such as a file management system, end-user facilities and data entry facilities, can all be managed by a data dictionary. The software facility can give the systems manager more control over the system, solve the problem of data elements ownership and cut the total cost of system development, Meyer said.

But the problem with current data dictionaries is they tend to be developed differently. Meyer noted there are at least three organizations working to develop standards for data dictionaries.

The British Working Party is trying to standardize a conceptual design for data dictionaries, and two U.S. groups — the National Bureau of Standards and the American National Standards Institute — are working to develop standards that could be used in the field.

But for data dictionary standards to be useful, Meyer said they must be applicable to the whole system life cycle. As data dictionary technology advances, use of the facility will grow closer to the design phase of systems development. At that point, standardization becomes even more critical to insure that systems are built in a similar fashion.

Handle Expansion

In addition, a data dictionary must be able to effectively handle systems expansion and changes to the design. Noting that especially in the area of software, the specifications for a system have often dramatically changed before the ink is dry on the coding pad, Meyer said the data dictionary must be flexible enough to handle constant change.

It must be able to handle new attributes and clearly define relationships among changing data elements to be effective. And the dictionary must also be able to adapt to technological changes, Meyer said.

The trend in systems design is to steer away from keeping track of physical files to governing logical, or like files. That makes the job of the data dictionary a bit more complex, but it also forces the data dictionary to perform a more important task.

When programs that affect the same group of files are introduced from a variety of sources, it takes extra effort on the programmer's part to make sure parts of one program don't have an adverse effect on the data or other programs that use a common file. A properly designed data dictionary can perform that function and free up expensive programmers for more developmental duties, Meyer said.

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Today's Historians Likened to 'Seed Corn'

By Marguerite Zientara
CW Staff

CHICAGO — The handful of computer historians in the world today represent the "seed corn" of coming growth in the area and indicate the maturity of the industry itself, according to Paul Armer, executive secretary of The Charles Babbage Institute.

As session leader of "Perspectives on the History of Computing" at the National Computer Conference held here last week, Armer noted the recent increased interest in computing's history as embodied in several newly or about-to-be published books and observed that the field of computer history is now at the stage where computer science itself was in the 1950s.

While it is fairly commonly known that the German scientist Konrad Zuse constructed the first automatic, programmable calculating machine dur-

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ing World War II, it is less commonly realized that he also made significant contributions to the theory of computer science, as well as to the design of the machines themselves, according to speaker Paul Ceruzzi, assistant professor in the Department of Science and Technology at Texas Tech University in Lubbock, Texas.

Zuse studied at the Technical College of Berlin in the 1930s, concentrating on civil and mechanical engineering, Ceruzzi said. One of the problems he encountered in his studies was that of static indeterminate loads, which called for complicated mathematical formulas.

It was through this need that Zuse got the idea to mechanize the routine calculations required and to solve systems of linear equations. Zuse had no training in advanced mathematics or electrical engineering, although he was skilled in mechanics.

In 1936 Zuse recognized that the binary system was the best one to be used by automatic calculating machines, long before the idea was commonplace.

At that time, Zuse designed a method of representing binary digits through a mechanical system, primarily mechanical relays.

Zuse ran into problems in the design of the arithmetic unit of the proposed machine and backed off the puzzle in 1937. At that point, he developed an abstract representation of binary switching, working out the relationships among the three fundamental notations AND, OR and NOT.

Zuse soon returned to the construction of a digital device, a project that resulted in the construction, aided by Helmut Schreyer, of the Z-1 computer.

The Z-1 never functioned correctly because of problems in the mechanical switching elements, Ceruzzi noted. The next machine, the Z-2, featured electromagnetic circuits, and the Z-3 was an all-relay device, the original of which was destroyed in 1945 in the final days of World War II.

Work on the Z-4 began also during the last days of the war, but was interrupted when Zuse was evacuated from Germany and migrated to an Alpine village, taking his machine with him.

Since the machine was stored in a barn with sporadic supplies of electricity, Zuse couldn't do much work on it; after its early head start on America — German work on computer development came to a halt.

Zuse then concentrated on theoretical work and designed his "Plan Kalkul" system of notation, containing many of the features of the higher-level languages.

Zuse also designed what would today be a hard-wired compiler, Ceruzzi said, and independently established the isomorphism of statements of symbolic logic to relay circuits.

Zuse went on to found a company that was later absorbed by Siemens and which was in the 1950s No. 2 in Germany after IBM. He is still very active today, Ceruzzi noted.

Development Centers

Speaker Martin Campbell-Kelly, lecturer on computer history in the Computer Science Department at the University of Warwick in Coventry, England, discussed the three major centers of computer development in England around 1950: Cambridge University (developer of Edsac), Manchester University (developer of Mark I) and the National Physical Laboratory (developer of the Pilot ACE).

After displaying slides showing a subroutine for a square root in each of the three centers' notations, Campbell-Kelly noted that Cambridge was by far the most advanced in programming development at that time.

Most of the subsequent early computers drew on Cambridge's expertise, he noted, including Mark I, Mark I*, Pegasus, HEC 2M, HEC 4, Elliott 402, Deuce, Mosaic, Leo, Treac and Nicholas.

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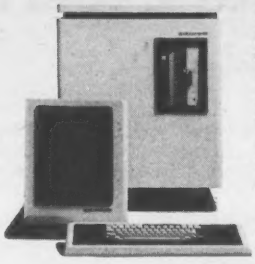

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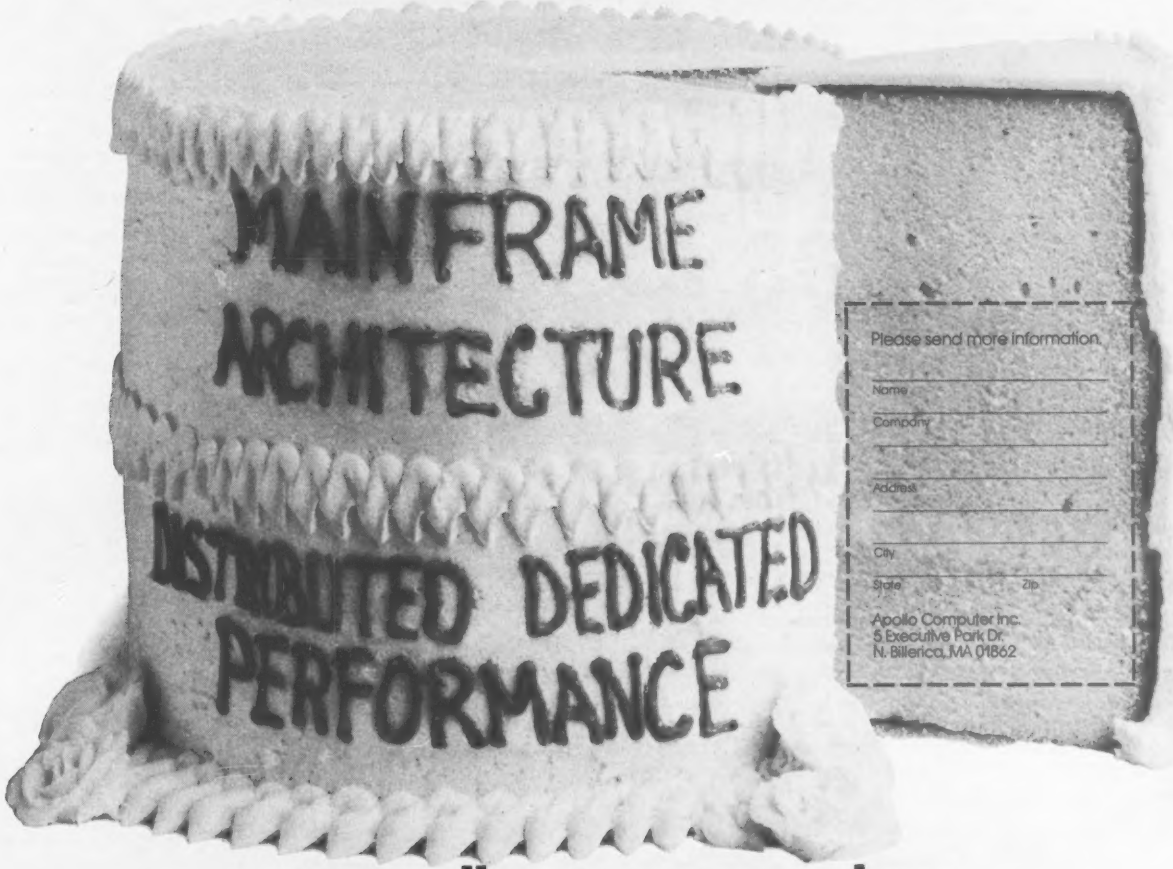

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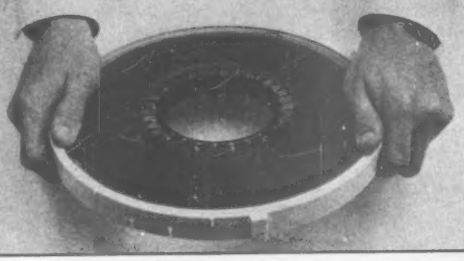

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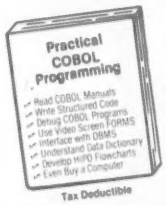

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Beal Urges New Breed Of Informatics Expert

By Jake Kirchner
CW Washington Bureau

CHICAGO — Delivering a National Computer Conference keynote address last week, Special Presidential Assistant Dr. Richard S. Beal called for a new breed of "informatics generalist" to assist the country in its transformation into an information society.

"What is constipating society is a failure to make decisions," according to Beal, White House assistant for planning and evaluation. Today's decision makers "simply do not know how to use the technology" that is becoming available, he said.

CW at NCC

We cannot wait for a whole new generation of decision makers, he continued. "Decision makers have to lead and cannot lag in comprehending and adopting" the technology. In the near future, he concluded, they will have to rely on informatics generalists who can adopt the technology to new decision-making systems.

Beal foresees these generalists as experts in system design, data acquisition, data reduction and dissemination and other technological specialities needed by today's managers.

"Such people are made, not born," he said. "Such people are not technologists, but effective use of information and information technology should be their second nature."

From his own perspective, Beal said the need for such assistance "is even more acute in the White House . . . For us," he said, "the stakes are high." The value of policies and decisions made in the White House "are disproportionate to the cost of producing them," he explained.

And the costs are not low, he said. Pointing out presidential decisions affect the whole federal budget, Beal valued President Reagan's time at $100,000 per second.

"For the first time in the Presidency we have in the White House a professional communicator," Beal said of Reagan, arguing the White House's need for information access is becoming more pressing every year.

Unfortunately, he said, the White House information facilities have fallen far behind those of other institutions. "In meeting the management challenges of the modern presidency, we find that we don't even have the right kind of wires in the building," Beal said, noting he had difficulty getting "a simple graphics terminal" installed in his office.

The new administration is well aware of these problems, Beal said. He read from a White House telegram to the NCC in which Reagan noted "in the years ahead, new technologies will be required to meet the ever-increasing demands of our modern society to ensure America's growth."

The problems are not limited to the executive branch of the government, Beal continued, but are being felt in all branches of the federal bureaucracy.

"There is a lot of catching up to do in the '80s," he said, pointing to the growing obsolescence of government computer systems. He also noted statistics produced recently with IBM's aid that project the government falling further and further behind the private sector in sophisticated information technology use.

The federal government currently has one terminal for every 36 employees, compared to one terminal for every 48 workers in the general American workforce, according to the statistics.

In the near future, Beal said, every 10 employees in the general work force will have access to a computer terminal, but by then the government ratio will only be one terminal per 20 workers.

The problem is directly related to the changing roles of all institutions, not just the government, as the confluence of computing, communications and information remakes the face of our society, Beal stressed.

It is clear, he concluded, that informatics "raises a previously unaddressed set of questions" about federal mechanisms and government investment in information development and dissemination.

CW Photo by A. Dooley

NCC attendee goes under cover to get the real story.

Panel Criticizes ISO Model For Linkage Shortcomings

By Brad Schultz
CW Staff

CHICAGO — Many IBM customers want smooth communications among different brands of DP equipment, an IBM scientist told a National Computer Conference session last week, but other speakers joined him in claiming the International Standards Organization's (ISO) model for open systems interconnection fails to satisfy fully this demand.

CW at NCC

The ISO model — a prototype network architecture comprised of seven protocol layers — is not yet fully defined, the speakers noted. However, Digital Technology, Inc.'s John Day, who has assisted efforts to develop the model, said a draft of all seven layers may be adopted by ISO this summer.

ISO has adopted three layers thus far, corresponding to the physical interfacing of terminal equipment, the passage of data from terminal equipment to the user's interface with the public network and transfer across that interface to the public network.

IBM's Systems Network Architecture (SNA), which began as a basis for products in 1974, is also a hierarchy of protocol layers, but differs from the emerging ISO design in constraints on communications between different product brands and the relation of host systems to dispersed machines.

SNA vs. ISO

Matt Hess of IBM's operation in Research Triangle Park, N.C., said ISO's model for open systems interconnection addresses communications between end-user systems, but does not handle important considerations of how the user may control systems in different vendor environments.

SNA, on the other hand, has come to bear on both links between end-user systems and the control issues, Hess maintained.

Nevertheless, many experts have criticized SNA as allegedly locking the user into sole-source dependence on IBM.

John G. Fletcher, who developed the Octopus network for Lawrence Livermore Laboratories, told the conference session that definitions of protocols in the ISO model are too obscure, ambiguous and noninterdependent. The ISO model diffuses user management responsibilities, Fletcher said, suggesting that the model delegates too much authority for effective overall controls to exist.

Dr. Vinton G. Cerf of the Defense Department's Advanced Research Projects Agency said data communications for the nation's military calls for network architectures with features ISO and most commercial vendors have not developed. The armed forces may, to an extent, run systems primarily developed for commercial DP, but unsuitable for wartime situations where transmission wires are burned up or microwave broadcasting is jammed.

Cerf said standardization of network architectures may allow the National Bureau of Standards to insist that the General Services Administration order compliance with protocol standards in federal DP installations.

However, Fletcher said Lawrence Livermore, which serves the Department of Energy, is reluctant to adopt the ISO model until analysis shows the research institute's needs would then be satisfied.

The conference panel agreed that ISO's model has at least standardized the vocabulary for discussing issues of network architectures, allowing experts to focus on what those issues are. IBM's Hess added that the ISO model seems likely to become the basis for a raft of future protocol standards, some of which may be recognized by SNA.

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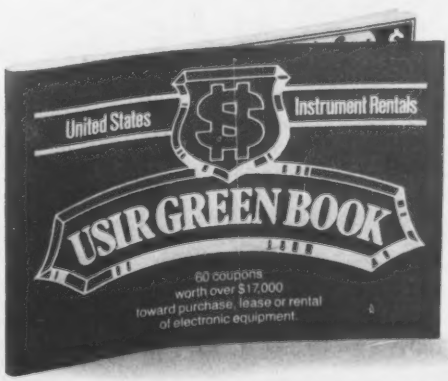

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NCC attendees listen in rapt attention to Sony presentation.

Packetized Voice Seen Impacting Workstations

By Phil Hirsch
CW Washington Bureau

CHICAGO — Development of personal workstations far more sophisticated than those now becoming available is one likely result of current research on packetized voice transmission, said Robert E. Kahn of the Advanced Research Projects Agency (Arpa) here.

Kahn, who participated in a National Computer Conference overview session on "Packet Speech Communications," said Arpa — a Defense Department research agency — is now experimentally transmitting packetized voice messages through a multiplexer that interfaces four local-area networks to a 3M bit/sec satellite channel. Each local-area network operates at 1.5M bit/sec and services a number of voice terminals. Packetizing/depacketizing occurs at the terminals.

CW at NCC

A key benefit of using packet networks to transmit voice messages is that it greatly improves bandwidth utilization, Kahn pointed out. He estimated that, as a result, utilization of a given amount of bandwidth can be improved one-and-a-half to three times when packet switching is substituted for circuit switching.

Transmitting voice in digital form, besides making it possible to exploit packetization, also allows the message to be interpreted by a machine — thus permitting humans to interact directly with computers rather than through a keyboard, pointed out session chairman Danny Cohen of the University of Southern California.

"The cost of digital speech is decreasing at a remarkable rate," Cohen explained. "Therefore, even though the cost of digital speech may still appear prohibitive, the situation is bound to change in the near future."

Better Understanding

Until recently, the task of converting analog voice signals into digital form "was not well understood," Cohen said, "and it required computations at rates that could be provided only by supercomputers. But as a result of the work of many researchers in several institutes, a better algorithmic understanding of the vocoding task has recently been achieved. Recent developments in computer technology and architecture as well as in the very large-scale integration field allow the implementation of these algorithms by a compact hardware configuration."

Packet-switching technology "has proved capable of supporting real-time speech applications. Recent developments in signal processing, vocoding algorithms and hardware have made the implementation of voice terminals a very practical means of voice communications. The interest that several telephone companies have shown in packet speech and the amount of effort they are investing in it are a significant testimony to its importance and potential, he concluded.

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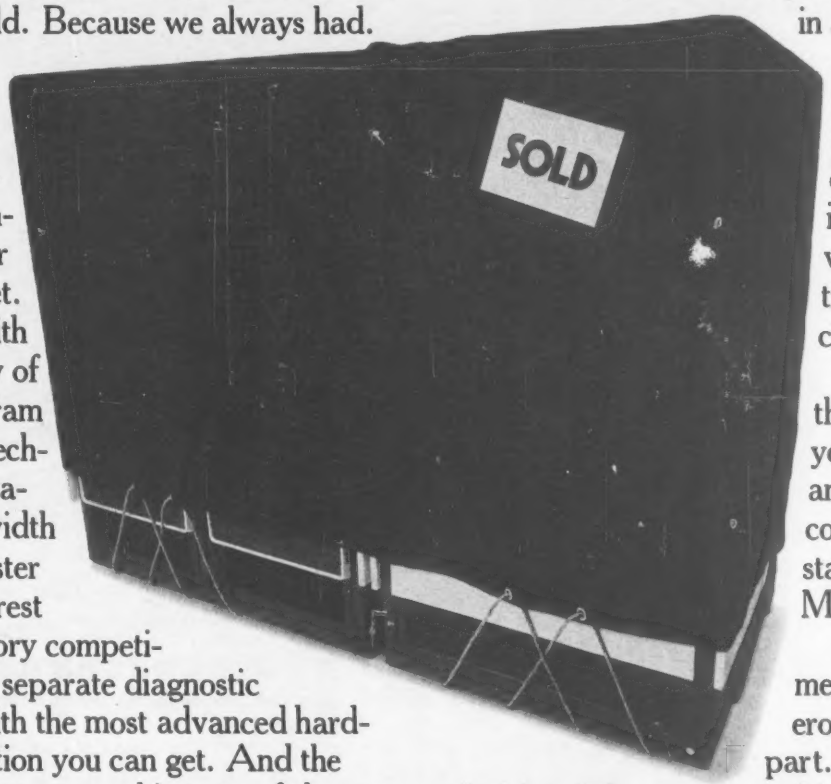

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DBMS Styles Held to Differ

By Jeffry Beeler
CW West Coast Bureau

CHICAGO — No single style of distributed data base management system (DBMS) is equally suitable for all users and applications, a Univac spokesman said during the National Computer Conference.

Because data base requirements vary widely from installation to installation, users need a broad selection of DBMS approaches, Richard Greene, who works in Univac's data management systems operation in Blue Bell, Pa., said in a session entitled "Distributed DBMS in the Transaction Environment."

Users also have to choose carefully among the various DBMS styles to make sure their preferred approach conforms closely to their individual application needs.

To underscore his message, Greene likened DBMS approaches in at least one important respect to programming languages. The quality of a programming language, he said, depends on the extent to which it fits the characteristics of its intended application, and exactly the same principle applies to DBMS styles.

One of the many DBMS styles now under development or already available for users is the so-called "cooperative multithread" approach, which Univac has recently devised in an attempt to provide a quantitative method for evaluating data base system performance, Greene said.

Other session participants included Dr. John Smith, a research codirector for the Cambridge, Mass.-based Computer Corp. of America (CCA); and Paul De Citre, a research scientist with the University of Grenoble in France.

Retrieval Problems

Smith highlighted a technical problem common to many DBMS users: the need to retrieve data from multiple, heterogeneous data bases.

To overcome that hurdle, Smith and his CCA colleagues have developed a system known as Multibase, which allows users to integrate different kinds of data bases, he said. In essence, Multibase makes heterogeneous DBMS, even those situated in geographically widespread regions or associated with different vendors' hardware, seem like one to their users.

The prime objective in developing and supplying Multibase, Smith said, is to provide rapid responses to inquiries involving different data bases.

A secondary goal is to "support the [transfer] of applications from an existing collection of data bases to another, more advanced collection."

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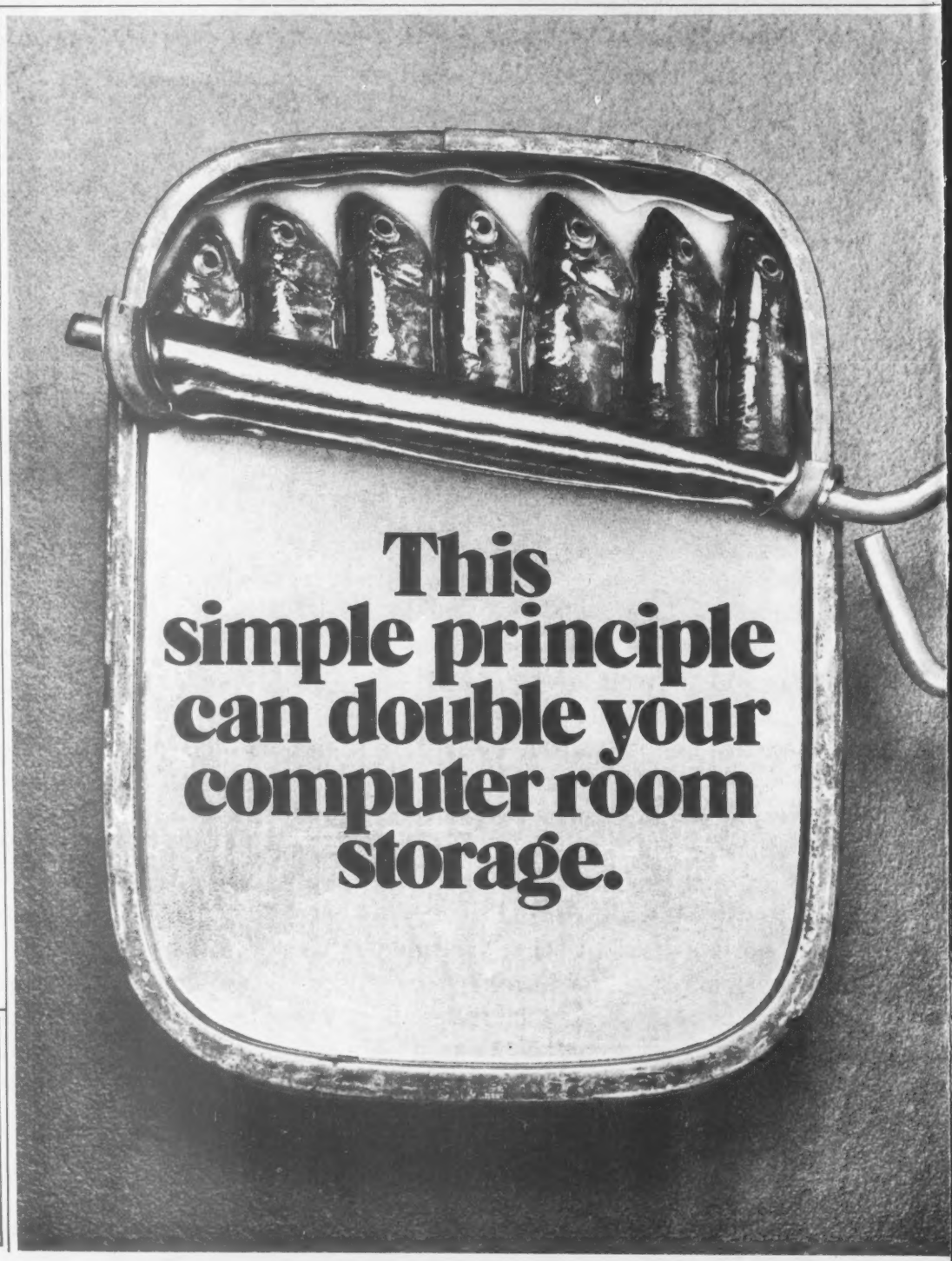
CW Photo by A. Dooley

Atari's Dave Thornburg points out a feature.



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Data Base Technology Said Lagging Theory

By Tom Henkel
CW Staff

CHICAGO — Data base machines are getting better, but the technology is still lagging behind the somewhat extensive list of theories on the subject, according to a panel of researchers.

Speaking before attendees at the National Computer Conference last week, session leader C.R. Carlson, with the Naperville, Ill., division of Bell Laboratories, noted this year's NCC had at least two vendors offering data base machines. Technology in the data base machine field is still far from its potential.

Data base machines, Carlson said, are used to take the load off the host processor in a data base environment. Often a host can become bogged down with queries to a data base management system (DBMS).

By placing a processor — or group of processors — between the host and disk storage, the host processor is, at least theoretically, relieved of the burden of processing DBMS queries, Carlson said.

There are many ways to implement such a system, technically called a back-end processor, but the method that best suits a given application depends on the user's needs and, to some extent, the philosophy of the system developer, Carlson said.

"There is no single machine that meets everyone's needs," Carlson said, noting there are two basic ways to construct a back-end processor. The question can be viewed from a single or multiprocessing point of view. In the single processing philosophy a general-purpose processor is often used as the go-between. In the multiprocessor environment dedicated processors are often used between the host and disk storage. Some data base machines use a combination of general-purpose and dedicated processors, Carlson said.

CW at NCC

Back-End Processors

While there have been varying degrees of success with data base machines, Carlson pointed out that research has shown some ways of improving the success rate with back-end processors.

First, Carlson said, the choice of disk storage is important. Fixed-head disk drives work well with some systems, and floating-head drives work better with others.

How data is stored is also an important factor. Carlson said users must prioritize their data and store it in a hierarchical fashion.

Data that is used frequently should be stored closer to the end user than infrequently used data. That makes it easier for the data base processor to find the data, get it out of disk or cache memory and send it to the host, which will then process it and present an answer to an end user's query.

One such system is being developed by Oki Electric Industry Co., Ltd. in Tokyo. Speaking for the company, Sadayuki Hikita said Oki's Content Addressable Database Access Machines (Cadam) employ three 16-bit microcomputers linked as one processing unit.

Other panelists were Mamoru Maekawa, with the University of Tokyo, and Sakti Pramanik Indiana University and Purdue University.

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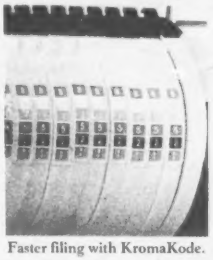

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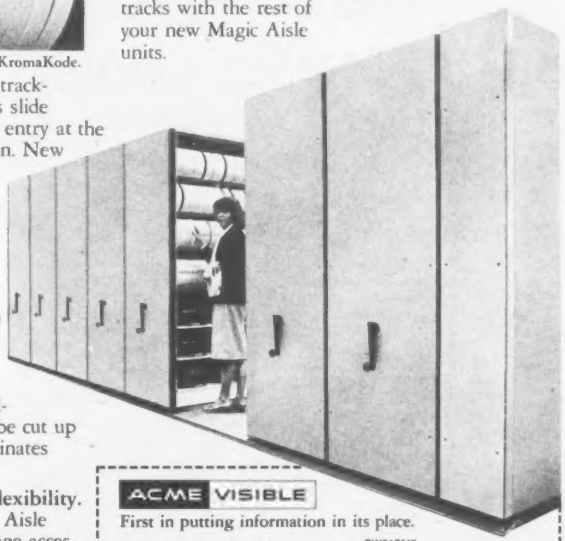

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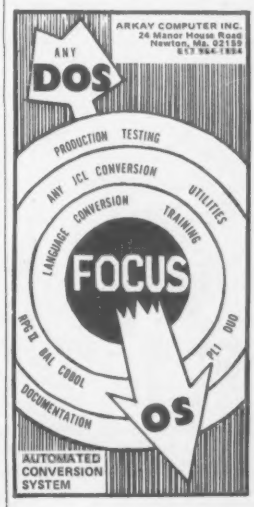

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Advances in DBMS Create Gap in Security, Control

By Bill Laberis
CW Staff

CHICAGO — Galloping technological advances in data base management systems (DBMS) and the manifestation of those advances in business are creating a security and control gap — one that can be of nightmarish proportions for data base auditors.

The shared data environment must be designed from the beginning with an eye toward control, yet in all too many systems the control and security factors are considered after the fact. Then the auditor is called in to make sense of what may be a critical security problem, despite the fact that adequate control techniques are usually available in the design stages.

That was the sobering message delivered last week by a panel of three seasoned field and internal auditors in

CW at NCC

a National Computer Conference session titled "Audit and Control in a Data Base Environment."

"This is kind of a situation which has fostered the common belief that DP auditors are corporate commandos who wear a three-piece suit, arrive after the battle to criticize the survivors and then shoot the wounded," Michael Stoneheme, field auditor for Coopers and Lybrand in Toronto, said.

Stoneheme described the data base environment as one characterized by an increasingly complex sharing of data, data shared among autonomous departments rather than by individuals exclusively. He said this rapidly changing environment is one in which an auditor "no longer looks at a simple one-to-one data relationship where he knows who has access to what data."

Lack of Personnel

Moreover, it is an environment in which there is an acute lack of personnel capable of handling and utilizing the continuous flow of new and innovative software developments that the vendors are madly churning out.

"With the number of data bases and systems out now — a number growing very fast — the audit function has become complicated even in some of the simpler routines," Stoneheme said.

To combat potential security and control problems, DP departments should act on a management mandate to build a better organizational infrastructure to minimize risk as much as possible. "That is, a business has to try and institute a data base system so that the level of risk built in is a manageable quantity, one addressed in the planning stages," Stoneheme said.

When asked, however, Stoneheme could not quantify what a manageable quantity of risk might be for any particular company, saying that overall control and security problem areas are diminished with careful planning.

Wally Pugh, national director of DP audit at Price Waterhouse and Co., said one factor that can affect control techniques in the data base environment is the migration of controls from the application program to the data base itself.

Among the techniques to be considered in the planning stages is implicit restriction of access to the data base's various subschemata.

In addition, system designers can make use of the encryption of security "locks and keys" and can build into the design the ability to monitor and analyze DBMS design codes.

But a potentially more serious concern in the development of data base controls lies in the intransigence of many system designers who chronically fail to "sit down in the design stages and bother to discuss with anyone just how they are going to build the controls in," said panelist Wayne Gould, vice-president and internal auditor at Bankers Trust Co. of New York.

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Dearth of Good Ideas

Small Systems Language Technology Attacked

By Robert Batt
CW West Coast Bureau

CHICAGO — A strong attack on the use of outmoded technology in the use of programming languages for small systems was made here by Elizabeth Rather, vice-president of Forth, Inc. on the opening day of the National Computer Conference here last week.

Speaking to a packed audience of programmers and systems analysts, Rather said the software industry was suffering from a dearth of good ideas, despite the fact that the industry had been through major hardware changes in the last two decades.

"The hardware industry has been through three complete revolutions in the form of transistor, solid-state and large-scale integration architectures. But people are programming computers with the same technology they were using 20 years ago," Rather said.

"Most of current-day languages are direct descendants of old technology and there is no breakthrough you can see on the horizon. There are very few genuinely new ideas in the entire software industry," she added.

Rather claimed that all the software on today's scene was originally designed to run on mainframes and had been squashed and made to fit into a small systems environment with varying degrees of success. There was a great deal of resistance to the concept that programmers should have to learn something new, although nobody questioned the notion that as hardware revolutions progressed, systems engineers have had to start from scratch again and again.

"Many people believe that new computers have to be made to look like old computers of 20 years ago, and I don't think that is necessary at all. Instead, we should be looking for small software. As users, you should demand that the programming language is small enough to run on the system you are compiling it for," she said.

Development Problems

Large programs, Rather said, were extremely expensive to develop in terms of time, debugging, maintenance and even, on occasions, cost. In addition, they were insulting to the ability and capabilities of programmers. "Lots of systems are designed from the point of view that most applications programmers do not have an IQ of over 75," she added.

The Forth language expert also poured scorn on the practice of overloading operations. Her overall objection was that the cost of an operator's trying to figure out which operation it was supposed to perform was not worth the effort involved. "I want an operator that can do the job, quickly, efficiently and well," she said.

Addressing the theme of this year's NCC — Keys to Productivity — Deane Blazie of Maryland Computer Services, in Bel Air, Md., said it was necessary to look at language as an all-encompassing programming environment.

"It is a total environment, having all the structured constructs incorporated into languages. In the 1980s we need to go a step further than we have done in the last 10 years and integrate facilities into the language or programming environment." Blazie said an example of such a feature would be a data base management system built as an integral part of the language.

"If we do this kind of thing, we will see a great increase in productivity. We will end up seeing the difference between interpreters and compilers going away or at least hidden as far as the programmers are concerned," Blazie added.

At the same session, David Robson of Xerox Corp.'s Palo Alto, Calif., research center, described some of the work the company was doing on developing a small systems language called Small Talk.

The language, he said, was oriented toward objects, classes and messages. So far, the language had only been run on four or five machines, Robson said.

CW at NCC

He jokingly added: "To date, the smallest thing about the language is its user community."

Nevertheless, the language received a great deal of interest from the audience, with many questions coming from the floor. In response to one of these, Robson said he believed that while the concepts one uses to describe a system should be small, the facilities to which it allowed access ought to be large. From this point of view, Small Talk aimed at having lots of functionality, including graphics, animation and a library browser. The smallest system would be around half a megabyte.

Robson said that hardware needs to be small because users want to be able to carry systems around with them. But, he added, the quality of smallness did not necessarily apply to software.

"Smallness in the size of the program is not always better. Take, for example, the case of APL, which in one line might be totally incomprehensible to a programmer, while in 10 lines it might begin to make some sense," he said.

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Corporate, Collegiate MIS Reciprocity Urged

By Bruce Hoard
CW Staff

CHICAGO — Reciprocity between corporate and collegiate MIS departments enhances all parties concerned, according to speakers representing those disciplines at the National Computer Conference session on "Joint Business-University Professional Development and Research Programs."

Robert Bensen, founder and director of the Center for the Study of Data Processing (CSDP) at Washington University described the birth of the CSDP as one of necessity. Because of St. Louis' isolated geographical location, it was necessary for the area to turn inward in search of MIS educational services.

"St. Louis ain't exactly the East Coast or the West Coast," he commented.

Formed five years ago with the backing of eight corporations in the St. Louis area, the CSDP now enjoys the support of 23 corporations that receive a variety of remunerations for their financial support.

CW at NCC

The idea behind CSDP is to bring together members of the corporate community that would otherwise consider themselves competitors instead of compatriots and to provide them with a forum where they can discuss mutual problems and work toward solutions, Bensen said.

One example of services rendered by CSDP is the round table it presents. The corporate affiliates (which sign up for an annual fee) provide the facilities and expertise for presentations on such topics as systems development methodologies or office automation, Benson said.

One of the institution's biggest problems is its diversity, the founder noted. Another problem is its "insidious growth."

Although it is wonderful to see full classrooms filled with enthusiastic students, it is less wonderful to keep up with the drain on resources that requires, he said.

James C. Wetherbe of the University of Minnesota's MIS Research Center said the objectives of that center have remained constant since its inception in 1968: the education and development of high-quality MIS practitioners and academics.

Corporate subscribers to the center are required to maintain their corporate headquarters in the Minneapolis-St. Paul area. There are currently 20 of them that pay $5,000 per annum, Wetherbe said.

The main thrusts of the center are MIS management, systems development, data base and distributed data processing. Research in those areas focuses on case studies, field experiments and specific areas of interest to subscribing companies. "We operate on a quid pro quo basis," Wetherbe said.

Task forces formed by the center bring companies together in the same manner of the CSDP, encouraging them to pursue topics of mutual interest and to write position papers on the results.

Student projects and internships may take the form of four-member groups that provide member companies with free consulting in areas of interest. Once again, the end result is usually position papers, he said.

The center offers training programs for companies outside of the center through its executive development centers. Members, however, receive a 25% discount.

Focus on Industry

Edwin Kerr, founder and executive vice-president of QED Information Sciences, Inc., approached the education requirements of DP professionals from a nonacademic standpoint.

Decrying the spread of media-based learning, he described his company's Electronic Data Processing Education Program (Edpep). Edpep was designed as a low-cost, dependable education program based on company subscriptions. During its original work with Babson College in 1974, the firm provided the curriculum and the school provided the facilities.

Since then, the company has grown to include six regional programs featuring two sessions annually. Companies subscribe by buying a block of seats that they may utilize in any fashion they desire, Kerr said. That includes the option of taking courses at any of the regional centers.

One advantage of the program is its tendency to make DP managers sit down and make binding decisions on the educational futures of their employees. Another advantage is the advisory councils found in each region, Kerr said.

Members of the advisory councils represent subscribing companies and meet once or twice monthly to discuss their needs. That prompted the executive vice-president to say, "Users have shaped the program for us."

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Outnumbered Other Foreign Contingents

Japanese Focus on Software at NCC This Year

By Tim Scannell
CW Staff

CHICAGO — Armed with notebooks, cameras and an insatiable curiosity, the Japanese were out in full force at this year's National Computer Conference.

But this year they focused their attention and lenses on software and the U.S. software companies, rather than primarily on the latest hardware and technological developments.

Officials at NCC's International Visitors Center — a friendly, glass-enclosed island set up in the sea of people and machines — believed that the Japanese outnumbered any other foreign contingent here at the conference and exhibition. They were followed closely by visitors from Brazil and England.

More than 500 foreigners had registered with the center just hours after the exhibit floor opened to the public, according to Milton D. Shulman, a professor at nearby DePaul University and one of the center's official "greeters." However, thousands turned up before the show's end last Thursday.

Interest in Exhibits

The majority of Japanese visitors were interested only in the exhibits showcased on the three football field-sized floors of McCormick Place. Very few were even marginally interested in attending any of the NCC's program sessions, according to Kazuhiro Ishida, a tour director who organized a group of 38 Japanese businesspeople and brought them to the show. This is the fifth year that Ishida has offered a tour to the NCC through his company, Travel Tokyo, Inc.

Fingering a black briefcase filled with statistics and the itineraries of his 38 charges, Ishida noted that nearly all of them were interested in one thing — software. In fact, half of the executives in the group were software manufacturers or are involved in some type of software research.

CW at NCC

Smiling coyly at references to the highly publicized "Japanese invasion" and claiming that Japan is probably equal to the U.S. in hardware capabilities, Ishida admitted it is painfully behind in software and software development.

As an example of Japan's software inadequacies, Ishida pointed out that his countrymen presently have no convenient or global method to keep track of any Japanese technological breakthroughs. Therefore, while productivity is high and the technology comes fast and furious in Japan, there is also a lot of duplication of manufacturing effort.

The Japanese are studying

(Continued on Page 36)

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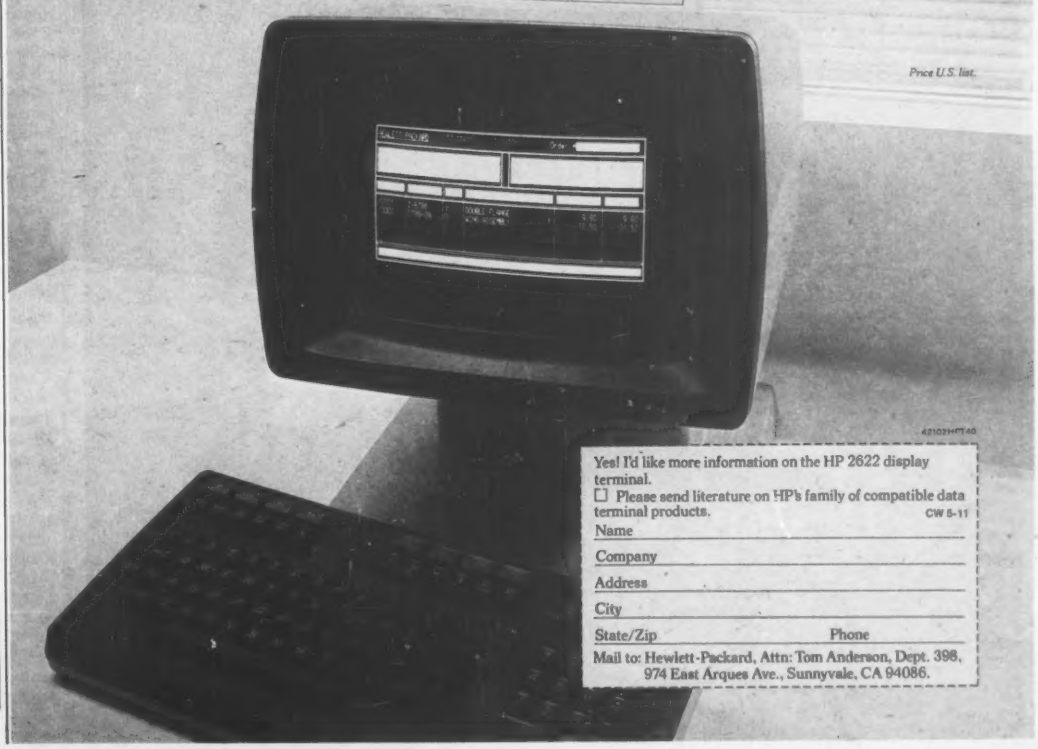

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Japanese Expecting to Move Up at NCC

By Bruce Hoard
CW Staff

CHICAGO — Did Japanese vendors get short shrift when many of them were grouped on the less desirable basement level here at the National Computer Conference? "No way," they said. They were happy to be here.

"I think it's just a matter of time," David Larin, sales manager for Hitachi, replied when asked why his company was downstairs instead of up. "We expect to have a better location in the future based on our four years of participation."

Dr. Hidehiko Ishikawa, general manager of the Office Automation Products Department for Konishiroku Photo Ind. Co., Ltd., said space was made available for his firm only after NCC's sponsor, the American Federation of Information Processing Societies (Afips), decided to open up more display space than was originally planned.

"We were on the waiting list," he said. "There were about 200 companies on the waiting list, so they changed the basic schedule." Because of its preeminence among computer shows, NCC is a must for Japanese vendors who wish to make it in the lucrative U.S. marketplace, he added.

"For survival in Japan, we have to sell our products in the American market," he continued. "If we only compete in Japan, we cannot survive, and we believe these are basic policies of most Japanese companies."

Will Konishiroku be back next year? "We would like," Ishikawa commented.

Fujitsu America is having it both ways with booths on both the upper and lower levels. Charles Palmer, a manager for the Far Eastern firm, sees no conspiracy against the Japanese in booth assignments.

"It's my understanding that in order to get to the prime space, length of service is a requisite, and we are latecomers," he said.

It is very important for Japanese vendors to be represented at NCC, according to Palmer. "With 70,000 people coming through, validity in the marketplace can be established by coming to NCC."

Fujitsu, which applied for booth space around last Christmas, also got off the waiting list and onto the exhibition floor when Afips opened up additional space.

Arthur L. Munzig Jr. was most emphatic in denying the Japanese had been relegated to inferior status on purpose. "It's impossible," the president of Computers International declared. "It's done very openly and everybody knows how."

How important is NCC to companies like ITS Japan, for which his company distributes in the U.S.? "It's quite essential, just as other computer conferences are," Munzig said. "If you could only go to one show a year, it would be NCC."

Companies like ITS Japan would die out if they were locked out of the U.S. computer market, he added.

The Afips Points System

How does the American Federation of Information Processing Societies (Afips) determine booth locations at the National Computer Conference?

Exhibitors are given priority on the basis of a points system, according to an Afips spokeswoman:

- Ten points are given for each year a company has been represented at the show.
- Eight points are awarded for each year a firm has taken part in the Personal Computing Festival.
- One point is awarded for each 100 sq ft of exhibit space used in exhibit programs.

If a company drops out of NCC for two years or longer, it loses all its points. If it stays away for only one year, its status remains intact.

Space assignments for next year's Houston "Astrohall" show were being made last week.

CW at NCC

Japanese Focus On Software

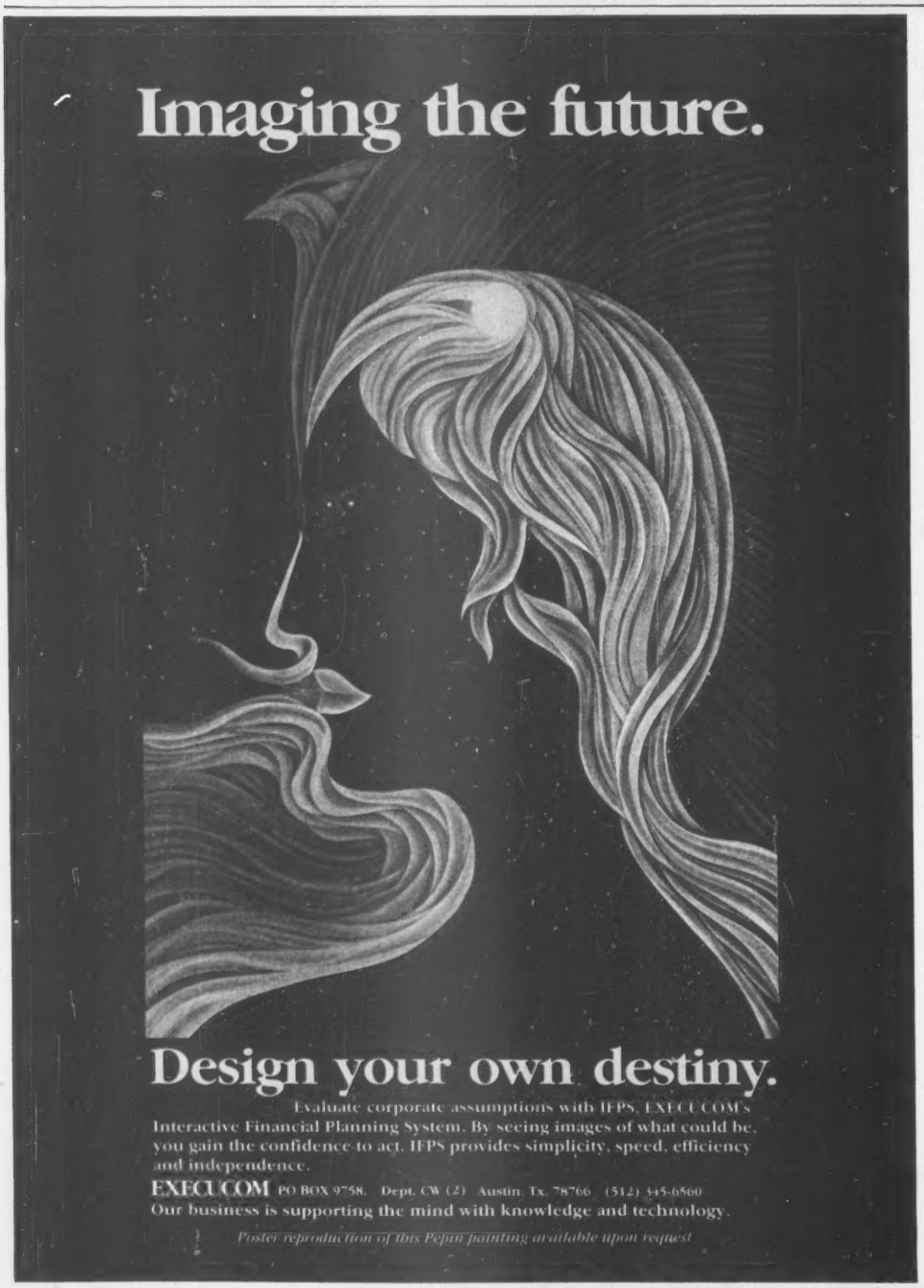
(Continued from Page 35)

the U.S. patent procedures and tracking methods to overcome this.

The 38 Japanese businesspeople — mainly from the manufacturing arena — signed on for Ishida's NCC scouting trip through the *Daily Industrial News*, a Japanese newspaper that ran several ads to drum up interest in the trip. The group is coordinated by Haruhisa Ishida, an associate professor and head of research and development at the University of Tokyo's computer center.

Besides helping the group separate the software wheat from the chaffe at the show, Prof. Ishida also took the group to local universities and companies to examine their computer operations. Back in Japan, each of the 38 businesspeople will deliver a report on various impressions of the U.S. software field.

The group was scheduled to return to Japan late Wednesday.



Bellisario Urges Imagination, Innovation In Telematics for Business, Society

CW Photo by A. Dooley

Marisa Bellisario

By Marguerite Zientara
CW Staff

CHICAGO—The future merging of data processing and telecommunications technologies will be "one of the most important changes in business and society," keynoter Marisa Bellisario said last week.

In effecting that merger, "we must use our imaginations and innovation without being tied to the traditional data processing and telecommunications approaches," she advised an audience of 500 National Computer Conference attendees.

Bellisario, described as "the highest ranking woman line executive in the computer industry worldwide," is co-general manager and member of the management board of Italtel SPA in Milan, Italy.

Following a five-minute welcoming speech by Chicago Mayor Jane M. Byrne, who noted that those not involved in DP are "overwhelmed" by the fast progress and ubiquitousness of the computer industry, Bellisario described the future merging of the DP and communications worlds.

Office Productivity

Drawing on the European experience in France, the UK, West Germany and Italy, Bellisario cited the increased productivity in the office and noted that "the new technology should be dedicated to increasing the ease with which people do their work and to making their jobs more interesting."

Exploring "The New Field of Telematics" (from the French-coined word "telematique"), Bellisario displayed slides showing that white-collar productivity has lagged behind blue-collar productivity in recent years. "That situation will change sharply in the future; it is a great opportunity for our industry," she observed.

Based on the two-way exchange of information using home or business television sets and pushbutton telephones, development will occur in the areas of data collection and processing, development and generation of images, text development and generation and documentation and storage, she predicted. Languages, data, text and graphics will all be integrated by telecommunications in applications accessible through any of the 500 million telephones installed worldwide, she noted, adding that every phone is "a potential terminal in the home or business for the new world of telematics."

Business Applications

While explaining that the merger of telecommunications and DP will result in such generally useful applications as telecontrol of energy consumption and police "tele-alarms," Bellisario concentrated on the developing business applications in the field. Citing a projected annual increase of 7.2% between 1980 and 1990 in the world market of office automation, she pointed out that lowering telecommunications costs will result in more efficient telematics technology.

Describing the score of telematics projects now being undertaken in France, England, West Germany and Italy, she stressed the great impact these technologies are having and will have on society at large. For example, in West Germany teletex is expected to replace telex services in the next few years. "Providing two services with one machine will mean a sharp reduction in the work done in the office."

England's Prestel service, the most

CW at NCC

advanced of its kind, already allows users to access a number of different services using a television set, in a two-way exchange of information. She cited one successful business user, "related to the stock exchange" in London.

In discussing the future role of the PABX, Bellisario explained that telecommunications equipment, distributed information processing and telematics will all be connected to PABX systems for the integration of relative services. "We will be able to exchange information among all those services."

In conclusion, Bellisario projected that telematics' growth will probably follow a scenario in which the Japanese develop the most low-cost equipment, Europe contributes the data bases and services provided through its already evident initiative and "the U.S. will probably be the one in the end to standardize all this."

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Registration for Some Took Less Than 10 Minutes

CHICAGO — Would you believe that you could register at the National Computer Conference in less than 10 minutes, even if you had not done one bit of preregistration planning? Well, it happened.

Harry Poole, a Rhode Island computer consultant, hopped bleary-eyed off the Palmer House hotel shuttle bus at 8:40 a.m. last Monday, after first taking a Chicago city bus from his hotel 10 miles from McCormick Place. He had not decided to attend the conference until Sunday night and he was convinced that registration would be a horror.

At the shuttle bus door Harry was met by candy-striped student guides hired by McCormick Place to speed the registration process. They directed him to "follow the red rug," the rug designated for all those unlucky enough not to have done any preconference preparation.

Commenting on the quality of the rug, Harry soon realized that he had run out of it. He immediately made a left-face and asked a woman seated at a nearby official-looking table, "Where do I go?" The woman answered, "What are you?"

"I've been asked who I am, but never what I am," Harry noted, but then realized what the woman wanted to know was if he was an exhibitor, member of the press or an attendee. "I'm an attendee," he said. The woman replied, "Then why don't you follow the red rug?" "Because I ran out of rug," he exclaimed. Luckily, at that point Harry noticed he was standing exactly where he was supposed to be.

Filling out the registration form was relatively easy. The only information missing, Harry noticed, was whether to put his first name first or last name first. He was adventurous and did it his way, first name first.

"The lines are short!" Harry exclaimed. They were, in fact, only five or six people deep, which made the process of forking over the $75 fee a lot more tolerable.

Next stop was a visit to the ACS Registration Control System, which supplies the conference badges. Another student, JoAnn, keyed in Harry's registration information and in seconds had a plastic badge for Harry to pin on.

It was a pretty painless procedure. "I have to give credit to Afips for a good method of registration," Harry noted.

NCC: A Must For Local Youth

CHICAGO—The IBM, Qantel Corp. and Digital Equipment Corp. exhibits on the floor of the National Computer Conference were of particular interest to Kay Borzroy last week. Sessions on high-level languages and software development are also on his agenda. Why should his interests by any more important than anyone else's? Because Kay is only 12 years old.

With NCC in town, Kay, a sometime user of a DEC CPU at the Ogden School here, felt a visit to the show was a must.

The Chicago schoolboy was a guest at Apple Computer, Inc.'s International Apple Core meeting held here. He had written a letter to Apple's founders, Steve Jobs and Steve Wozniak, and told them of his interest in computers, especially their Apple II.

"I'm very interested in the world of computers and computer technology," he said. "I try to keep up with as many of the publications which cover the field as best I can." Kay's long-term aspiration is to own his own software business, which he is beginning to formulate. He wants to be like his "heroes," Jobs and Wozniak.

When asked if the size and magnitude of NCC left him a little in awe, Kay said, "Not really, I've been to this kind of thing before."

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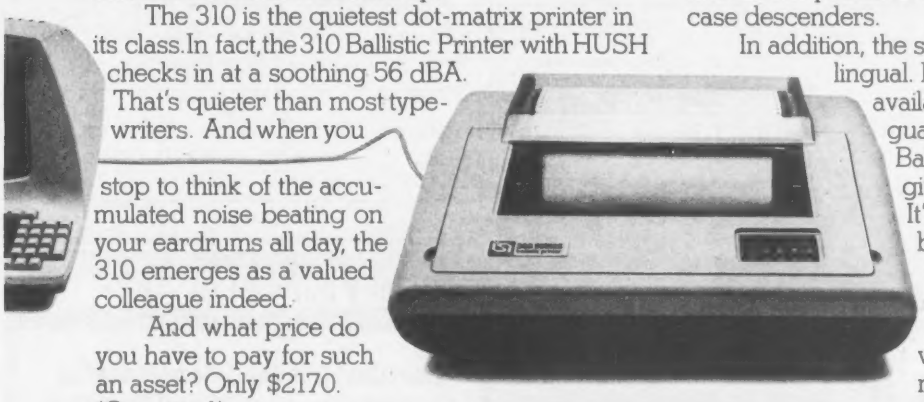

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Managers on the Move

WILLIAM L. SANDERS has been appointed director of systems for Inland Steel Co. of Chicago. He succeeds G. Nichols Simonds, who recently resigned.

Sanders joined Inland in 1969 as a staff assistant in the systems department and served as manager of manufacturing systems. Named assistant manager of data processing in 1975, he went on to become manager of systems maintenance in 1978 and manager of manufacturing systems in 1979.

In resulting and concurrent promotions, Warren J. Harrington has been named manager of corporate systems; John E. Mitchell has been appointed manager of manufacturing systems; and Jerome J. Rudy has become assistant superintendent, operations analysis.

• • •

JAMES A. MAGUIRE has been promoted to manager, data processing, at Chloride, Inc. in Tampa, Fla.

Maguire joined the Chloride DP staff in May 1980 as operations manager. He has an extensive background in information processing beginning in 1964 when he joined IBM and has held managerial posts in both systems/programming and operations. He received his B.S. degree in economics from Fordham University.

Brian J. Donushi succeeds Maguire as operations manager, data processing. He has served as project manager in the firm's DP department since 1979 and as project leader and senior programmer analyst before that.

Marcie Long has been appointed to the newly created post of manager, systems and programming. She will direct the corporate systems and programming staff and oversee the maintenance of programming standards for the company. Long came to Chloride in 1976 and has served as a project manager, program analyst, senior programmer and project leader.

• • •

CHARLES COUGHLIN has been promoted to systems development manager in the management information systems department of Kendall Co., a subsidiary of Colgate-Palmolive Co., located in Boston.

Coughlin came to the company in 1969 and has held several positions within the management information systems department since that time. He is now responsible for all systems development, computer programming and systems implementation.

Coughlin holds a bachelor's degree in business administration from Bryant College.

• • •

ROBERT L. BARLEY and JAMES A. SHATTUCK have been appointed assistant vice-presidents for the Missouri Pacific Railroad's information and control systems department, based in St. Louis.

Barley, who had been assistant director of planning and operations since 1978, joined the railroad in 1970 as manager of systems analysis and procedures.

Shattuck had been assistant director of development and implementation since 1978. He joined the organization in 1970 as assistant manager of systems development.

Both Barley and Shattuck are recent graduates of Harvard University's Program for Management Development.

• • •

ILMARS RITINS has joined the staff of CDI Corp. in Philadelphia as corporate director of management information systems.

With his extensive background in computer operations and management information systems, Ritins will now head up all corporate information processing functions within CDI and its subsidiaries.

JOHN P. SINGLETON was recently named executive vice-president in charge of Maryland National Bank's operations and data processing divisions.

Formerly senior vice-president responsible for those areas, Singleton will report to the bank's president and chief executive officer and serve on the bank's management committee as part of his new position. Singleton was appointed senior vice-president at Maryland National Bank in 1976. He previously served as corporate vice-president in charge of the systems and DP division of the Great Western Financial Corp. of Beverly Hills, Calif.

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June 8-12, Teaneck, N.J. — **Data Analysis/Data Base Design.** Contact: QED Information Sciences, Inc., QED Plaza, P.O. Box 181, Wellesley, Mass. 02181.

June 8-12, Chicago — **Computers in Manufacturing Conference and Workshop.** Contact: Registrar, NIMR Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

June 8-26, St. Charles, Ill. — **Computer Fundamentals.** Contact: Muriel Lederer, Arthur Andersen & Co., 69 W. Washington St., Chicago, Ill. 60602.

June 9-12, Boston — **Human Relations: Productive Working Relationships.** Contact: QED Information Sciences, Inc., QED Plaza, P.O. Box 181, Wellesley, Mass. 02181.

June 9-10, Washington, D.C. — **ADP Systems Risk Analysis.** Contact: Director, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

June 9-11, Dallas — **Ada Programming Structures.** Contact: Office of Special Programs, Polytechnic Institute of New York, 333 Jay St., Brooklyn, N.Y. 11201. Also being held June 17-19 in Washington, D.C., and June 24-26 in Los Angeles.

June 9-12, Seattle — **Computer Graphics Systems: Design and Applications.** Contact: Director, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

June 9-11, New York — **Project Leadership Workshop.** Contact: Advanced Training Center, Division of Chubb Institute, 480 Morris Ave., Summit, N.J. 07901.

June 9-11, Phoenix — **Software Quality Assurance.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

June 9-11, Reno, Nev. — **Data Communications: Components, Systems & Networks.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

June 9-10, New York — **Optimizing Long-Distance Services.** Contact: Business Communications Review, 36 S. Washington St., Hinsdale, Ill. 60521.

June 9-11, Paris — **Fibre Optique 81.** Contact: Ellen M. Bond, Director, Expositions and Publications, Information Gatekeepers, Inc., Suite 111, 167 Corey Road, Brookline, Mass. 02146.

June 9, Chicago — **Turnkey Systems Seminar.** Contact: Tom Farewell, Association of Data Processing Service Organizations, Suite 300, 1300 N. 17th St., Arlington, Va. 22209.

June 10, Arlington, Va. — **Advertising/Corporate Communications.** Contact: Tom Farewell, Association of Data Processing Service Organizations, Suite 300, 1300 N. 17th St., Arlington, Va. 22209.

June 10, Washington, D.C. — **Microprocessors: Fundamentals and Applications.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

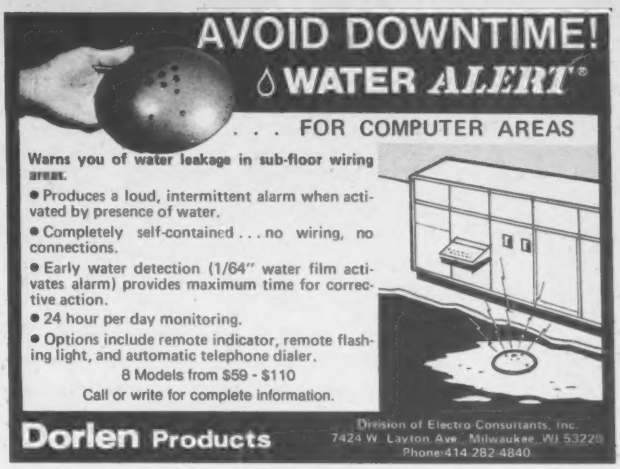
June 10-11, Washington, D.C. — **Federal Data Bases: Identification, Evaluation and Access.** Contact: Prof. Lowell H. Hattery, Center for Technology and Administration, The American University, Washington, D.C. 20016.

Forum to Foster DP Literacy

PALO ALTO, Calif. — The American Institutes for Research has started an information forum called Network for Industry, Computers and Education (Nice) to promote communication and computer literacy by creating links between the education community and the computer industry.

Nice publishes a newsletter for its members and plans to sponsor seminars and workshops, and to act as a clearinghouse for materials that can be used to encourage computer literacy in schools.

Those wishing to be added to the Nice mailing list can obtain information from the American Institutes for Research, Box 113, Palo Alto, Calif. 94302.



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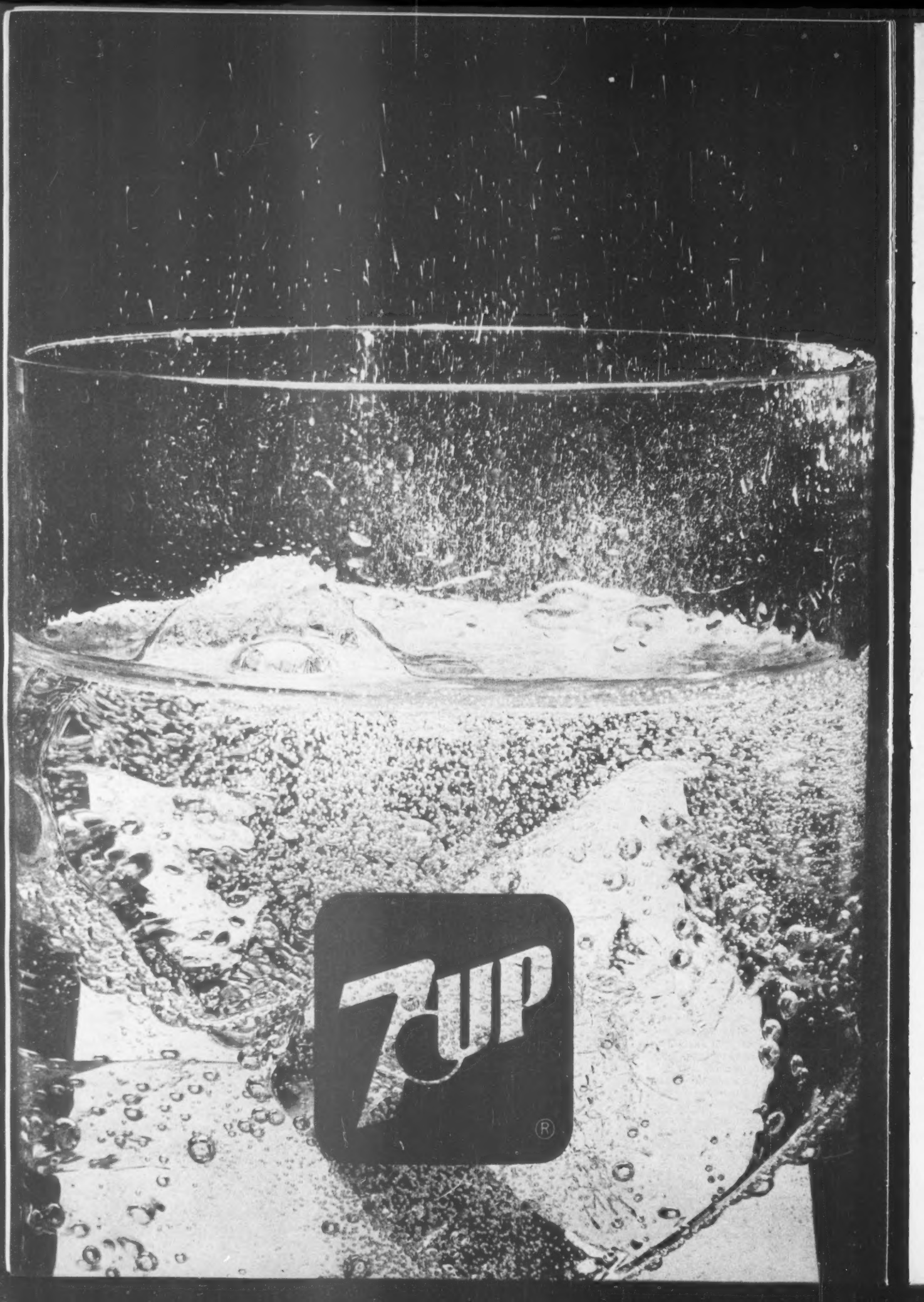
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BTI Minis Rated Above DEC's, DG's, IBM's

(Continued from Page 1)

and its relatively inexpensive small business computer held second place with a 3.78. BTI was also the only company out of 28 individually listed firms to have absolutely no problems listed in a category focusing on such things as late deliveries, inflated hardware and software costs and system compatibility.

Extensive Project

In its annual survey, which is the second most extensive project ever undertaken by the research firm, Datapro contacted computer users from its and *Computerworld's* subscriber lists. The company received replies from 2,173 users for a total of 2,804 minicomputer systems. Last year's survey, which generated more of a response, included 2,309 users and 3,437 systems. Also, in that survey a total of 34 vendors were rated, six more than this year's number.

The number of users and systems represented for any one firm ranged from a low of four users and four computers for Modular Computer Systems, Inc. to a high of 835 users and 996 systems for IBM. Systems were rated on a scale of zero to 4 — with 4 being the highest — or assigned percentages indicating how many of the polled users were happy with vendor support, system reliability and other human/machine aspects.

Besides coming in last with an average score of 2.2 in overall user satisfaction, GA — which was represented by 12 users with a total of 13 systems — scored lowest in technical support, a category that includes vendor troubleshooting, education and documentation. In addition, more than half of the polled users reported that GA did not provide all of the promised software and support, and three claimed that it was difficult to keep up with all of the vendor's changes to system hardware and software.

Finally, summing up their frustrations with GA's SPC-16 and 18/30 machines — the two systems spotlighted in the survey — nine out of the 12 users noted they would not recommend their system to other users. This ratio was greater than any other contained in the extensive survey.

About half of the surveyed GA system users were planning to replace their systems sometime this year, preferably with another vendor's machine. None of the dissatisfied users planned to stay in the firm's seemingly troubled hardware or software neighborhood. In addition, although the majority of GA system users claimed their computers lived up to expectations, a larger majority — nine of the users — said they would not recommend the system to other users.

Of the minicomputer heavyweights and those with more than 100 users and systems represented in the survey, Hewlett-Packard Co. gathered the greatest number of user satisfaction points, followed by IBM, DEC and DG. However, 8% of the IBM and 12% of the DG users reported they would not recommend their systems.

DG users showed the least enthusiasm for the firm's Nova 2 and Nova 800 computers, with about a quarter of the 11 polled users stating that the machines did not do what was expected. The firm's CS 40, 50 and 60 computers fared much better in the survey, although a small portion indicated that software deliveries were late and the CS 60 users noted some problems with the system's vendor-supplied applications programs.

Series/1 Complaints

Most complaints aimed at IBM minis seemed to center around the Series/1 and the System/38, according to Datapro's figures. About one-fourth of the 27 Series/1 users that responded to Datapro's questions noted the system and its software were delivered behind schedule. In addition, the same number pointed out that the configuration initially proposed by IBM was much too small to handle their requirements. Twelve percent of these users complained that the system did not do what was expected, and nearly 10% said they would not recommend the system to another user.

Although the 26 System/38 users in the survey have had their computers for only nine months or less, six have already complained that IBM did not keep all of its software support promises. A small percentage also stated that deliveries of both the System/38 hardware and software were late.

Despite these isolated problems, only about 3% of the 835 IBM users reported that their systems did not do what was expected, and a little more than 8% indicated that IBM computers would not be on the tips of their tongues when they whispered recommendations into other users' ears.

The computer systems voted most likely not to be recommended to other users were those from Computer Automation, Inc. Although only six users responded to the survey, two said the system was not all the vendor claimed it was and an equal number admitted that their comments would probably not be used by the firm to sell additional computers. Also, three of the six CA system users in the survey claimed the vendor did not provide all the promised software or support.

While a healthy portion of the more than 2,000 users surveyed by Datapro acknowledged they would be expanding their present hardware, only a small percentage indicated they would add distributed processing capabilities. In fact, a large majority of the users in the survey currently had central processing operations, with only a small chunk running distributed processing sites.

About a third will expand their data communications facilities, while about 12% to 15% will add integrated word processing to their sites. About a quarter of those surveyed said they would be acquiring additional software in 1981, with the sources for this software split almost evenly between the system vendor and outside suppliers.

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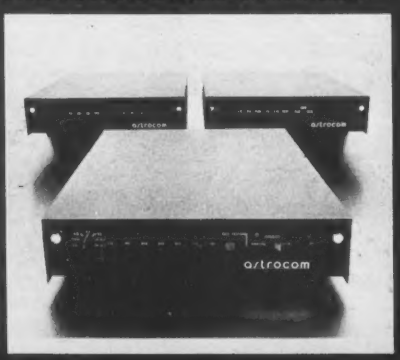

Users Rate Their Minis . . .

Survey Item / Manufacturer and Model	Basic Four 400/410	Basic Four 600/610	Basic Four 730	Basic Four (other models)	BTI 5000	Burroughs B 700	Burroughs B 80	Burroughs B 800	Burroughs B 90	Cado (all models)	Computer Automation (all models)
No. of User Responses	4	20	11	2	6	14	5	27	6	5	6
No. of Systems Represented	4	22	11	2	15	20	6	27	6	5	11
Avg. Life of System (Mos.)	21.3	17.9	21.0	20.5	27.4	58.3	28.6	19.9	9.3	11.6	20.2
Acquisition Method (%)											
Purchase	100.00	70.00	100.00	100.00	83.30	92.31	40.00	81.48	66.67	80.00	66.67
Rental or Lease from Mfr	0.00	5.00	0.00	0.00	0.00	7.69	40.00	14.81	0.00	0.00	0.00
Lease from 3rd Party	0.00	25.00	0.00	0.00	16.70	0.00	20.00	3.70	33.33	20.00	33.33
Principal Applications (%)											
Accounting/Billing	100.00	90.00	72.73	50.00	100.00	78.57	40.00	77.78	83.33	100.00	50.00
Banking-check processing/loans/savings	0.00	5.00	9.09	50.00	0.00	7.14	40.00	25.93	0.00	0.00	0.00
Construction/Architecture	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	33.33	0.00	0.00
Education-scheduling/administration	0.00	0.00	0.00	0.00	16.67	0.00	20.00	0.00	16.67	0.00	0.00
Engineering/Scientific	0.00	0.00	9.09	0.00	0.00	0.00	0.00	3.70	0.00	0.00	0.00
Health care/Medical	0.00	5.00	0.00	0.00	0.00	14.29	20.00	11.11	0.00	0.00	0.00
Insurance	0.00	5.00	9.09	0.00	0.00	7.14	0.00	7.41	0.00	20.00	0.00
Manufacturing	25.00	25.00	36.36	50.00	0.00	14.29	0.00	18.52	0.00	0.00	16.67
Mathematics/Statistics	0.00	5.00	9.09	0.00	0.00	7.14	0.00	0.00	0.00	0.00	0.00
Order Processing/Inventory Control	100.00	75.00	45.45	50.00	33.33	35.71	0.00	40.74	0.00	20.00	66.67
Payroll/Personnel	50.00	85.00	45.45	50.00	83.33	35.71	40.00	44.44	83.33	40.00	33.33
Petroleum/Fuel analysis	0.00	0.00	18.18	0.00	16.67	0.00	0.00	0.00	0.00	0.00	0.00
Process control	0.00	5.00	9.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Purchasing	75.00	45.00	27.27	50.00	16.67	0.00	0.00	22.22	0.00	20.00	16.67
Sales Distribution	100.00	65.00	36.36	50.00	33.33	14.29	0.00	37.04	0.00	40.00	33.33
Other	0.00	15.00	36.36	50.00	33.33	21.43	0.00	3.70	16.67	0.00	0.00
Source of Applications Programs (%)											
In-house personnel	75.00	50.00	63.64	0.00	83.33	42.86	40.00	51.85	33.33	20.00	83.33
"Ready-made" programs from manufacturer	0.00	30.00	27.27	0.00	0.00	42.86	60.00	51.85	50.00	80.00	0.00
Contract Programming	50.00	80.00	63.64	0.00	16.67	42.86	40.00	44.44	16.67	0.00	16.67
Manufacturer's Personnel	0.00	5.00	0.00	0.00	0.00	7.14	0.00	3.70	0.00	0.00	16.67
Proprietary Software Packages	25.00	40.00	45.45	100.00	33.33	14.29	20.00	29.63	33.33	0.00	16.77
Location of Computer (%)											
Distributed Processing Site	0.00	0.00	0.00	0.00	0.00	7.69	0.00	3.70	0.00	0.00	83.33
Central Processing Installation	100.00	100.00	100.00	100.00	100.00	92.31	100.00	96.30	100.00	100.00	16.67
Using Local Workstations/Terminals (%)	100.00	100.00	100.00	100.00	100.00	82.86	100.00	96.30	100.00	100.00	83.33
Using Remote Workstations/Terminals (%)	50.00	35.00	45.45	0.00	100.00	82.86	80.00	100.00	100.00	0.00	83.33
Using Data Base Management System (%)	0.00	25.00	27.27	0.00	16.67	7.14	20.00	29.63	33.33	40.00	50.00
None	100.00	75.00	72.73	100.00	83.33	85.71	80.00	66.67	66.67	60.00	50.00
Manufacturer's Package	0.00	40.00	33.33	0.00	0.00	0.00	0.00	62.50	50.00	100.00	50.00
Outside Vendor's Package	0.00	60.00	33.33	0.00	0.00	0.00	100.00	37.50	50.00	0.00	50.00
Home-Grown System	0.00	0.00	33.33	0.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
Using Communications Monitor (%)	25.00	5.00	36.36	0.00	66.67	0.00	0.00	40.74	33.33	0.00	33.33
None	75.00	95.00	63.64	100.00	33.33	100.00	100.00	48.15	66.67	100.00	33.33
Manufacturer's Package	100.00	100.00	100.00	0.00	100.00	0.00	0.00	90.91	0.00	100.00	50.00
Outside Vendor's Package	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	50.00
Home-Grown System	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	0.00	0.00
Using Integrated Word Processing Functions (%)	100.00	70.00	81.82	50.00	16.67	21.43	0.00	7.41	0.00	60.00	16.67
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	25.00	20.00	0.00	0.00	0.00	14.29	60.00	22.22	33.33	20.00	0.00
Proprietary Software from other suppliers	25.00	20.00	27.27	0.00	16.67	7.14	20.00	22.22	33.33	20.00	0.00
Expansions to Data Communications facilities	25.00	25.00	72.73	0.00	16.67	0.00	60.00	33.33	50.00	0.00	33.33
Distributed Processing capabilities	0.00	0.00	27.27	0.00	0.00	7.14	0.00	18.52	0.00	0.00	0.00
Expansions to present hardware	25.00	40.00	45.45	50.00	16.67	0.00	40.00	40.74	50.00	0.00	16.67
Another Computer System: same model	25.00	5.00	9.09	0.00	66.67	0.00	0.00	7.41	0.00	0.00	33.33
Integrated Word Processing capabilities	0.00	10.00	9.09	0.00	16.67	7.14	0.00	11.11	16.67	0.00	0.00
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	50.00	0.00	9.09	0.00	0.00	7.14	60.00	14.81	16.67	0.00	0.00
Yes, vendor unknown	25.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00	20.00	16.67
Yes, different vendor	0.00	0.00	18.18	0.00	0.00	21.43	0.00	3.70	0.00	0.00	16.67
No	25.00	100.00	63.64	100.00	100.00	57.14	40.00	81.48	83.33	80.00	66.67

Manufacturer and Model / Survey Item	Basic Four 400/410	Basic Four 600/610	Basic Four 730	Basic Four (other models)	BTI 5000	Burroughs B 700	Burroughs B 80	Burroughs B 800	Burroughs B 90	Cado (all models)	Computer Automation (all models)
Significant Advantages (%)											
Users are happy with response time	25.00	75.00	45.45	50.00	100.00	28.75	0.00	13.46	66.67	60.00	33.33
System is easy to expand/reconfigure	50.00	70.00	63.64	0.00	100.00	21.43	40.00	59.26	66.67	60.00	33.33
System costs were less than expected	0.00	20.00	0.00	0.00	0.00	7.14	0.00	0.00	50.00	40.00	0.00
Programs/data carried over from other systems are compatible, as vendor promised	0.00	35.00	18.18	50.00	33.33	0.00	20.00	14.81	0.00	0.00	0.00
Terminals/peripherals carried over from other system are compatible, as vendor promised	0.00	30.00	9.09	0.00	66.67	0.00	0.00	14.81	16.67	0.00	0.00
System is power/energy efficient	0.00	20.00	36.36	0.00	33.33	7.14	20.00	11.11	16.67	20.00	0.00
Productivity aids help us keep programming costs down	25.00	40.00	27.27	100.00	33.33	0.00	0.00	11.11	16.67	20.00	33.33
Data base language is efficient and effective	50.00	15.00	18.18	50.00	0.00	0.00	0.00	11.11	16.67	0.00	0.00
Delivery and/or installation of equipment was ahead of schedule	0.00	30.00	0.00	0.00	33.33	0.00	20.00	3.70	33.33	60.00	16.67
Delivery of required software was ahead of schedule	0.00	20.00	0.00	0.00	16.67	0.00	0.00	3.70	33.33	40.00	0.00
Significant Problems (%)											
Computer proposed by vendor was too small	50.00	5.00	18.18	0.00	0.00	21.43	40.00	33.33	0.00	0.00	16.67
Installation of equipment was late	0.00	5.00	9.09	0.00	0.00	0.00	20.00	48.15	33.33	0.00	16.67
Delivery of required software was late	25.00	0.00	0.00	0.00	0.00	7.14	20.00	25.93	33.33	20.00	16.67
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	0.00	0.00	0.00	0.00	0.00	21.43	0.00	29.63	16.67	0.00	33.33
Vendor did not provide all the promised software or support	25.00	10.00	0.00	0.00	0.00	28.57	20.00	14.81	50.00	20.00	50.00
Program/data compatibility not what vendor promised	0.00	5.00	0.00	0.00	0.00	14.29	0.00	18.53	16.67	20.00	16.67
Terminals/peripherals compatibility not what vendor promised	0.00	0.00	0.00	0.00	0.00	14.29	0.00	3.70	0.00	0.00	16.67
Vendor enhancements/changes to hardware/software hard to keep up with	0.00	0.00	0.00	0.00	0.00	21.43	20.00	18.52	0.00	20.00	0.00
Equipment is excessively noisy	25.00	5.00	18.18	0.00	0.00	14.29	20.00	42.86	16.67	0.00	0.00
Power and/or cooling requirements are excessive	25.00	5.00	0.00	0.00	0.00	14.29	0.00	3.70	0.00	0.00	16.67
System Ratings (4.0-0.0)											
Ease of operation	3.75	3.80	3.55	4.00	4.00	3.07	3.00	3.08	3.17	3.20	3.17
Reliability of Mainframe	2.75	3.60	3.45	4.00	3.83	3.14	3.80	3.07	3.50	3.40	2.50
Reliability of Peripherals	3.00	3.26	3.18	3.50	3.50	2.50	3.60	2.62	3.17	3.40	1.83
Maintenance service											
Responsiveness	3.00	2.95	3.18	3.50	3.67	2.50	2.80	2.74	2.67	3.20	2.50
Effectiveness	2.50	3.05	3.10	3.50	3.67	2.57	3.00	2.69	3.17	3.00	2.50
Technical support											
Trouble-shooting	2.33	2.72	2.27	3.50	3.67	2.08	3.00	2.08	2.50	2.80	2.00
Education	2.00	2.47	1.91	3.00	2.83	2.17	2.67	2.35	3.33	2.80	2.17
Documentation	1.67	2.50	2.09	3.00	2.83	1.83	1.60	2.26	2.67	2.80	1.83
Manufacturer's software											
Operating system	3.33	3.68	3.18	4.00	3.83	3.00	3.25	3.07	3.67	3.20	2.83
Compilers & Assemblers	2.67	3.73	3.20	4.00	3.50	2.17	3.00	2.76	3.40	4.00	2.83
Applications Programs	3.50	3.33	3.00	3.00	3.00	2.20	3.00	2.33	2.60	3.40	2.00
Ease of Programming	3.67	3.70	3.45	4.00	3.67	2.50	2.67	2.78	3.00	2.50	2.83
Ease of conversion	2.00	3.21	2.90	3.50	3.33	2.10	3.00	2.65	2.50	1.75	2.40
Overall satisfaction	2.50	3.45	3.00	4.00	3.83	2.64	2.75	2.62	3.00	3.50	2.33
Did the system do what you expected it to do? (%)											
Yes	75.00	95.00	81.82	100.00	100.00	71.43	80.00	48.15	50.00	80.00	66.67
No	0.00	5.00	9.09	0.00	0.00	28.57	20.00	29.63	16.67	20.00	33.33
Haven't decided	25.00	0.00	9.09	0.00	0.00	0.00	0.00	22.22	33.33	0.00	0.00
Would you recommend system to another user? (%)											
Yes	75.00	95.00	72.73	100.00	100.00	50.00	60.00	66.67	66.67	80.00	50.00
No	25.00	5.00	18.18	0.00	0.00	42.86	20.00	18.52	16.67	20.00	33.33
Haven't decided	0.00	0.00	9.09	0.00	7.14	0.00	11.11	16.67	16.67	0.00	16.67

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. . . And Their Manufacturers

Survey Item / Manufacturer and Model	Data General CS 40, 50	Data General CS 60	Data General Eclipse C	Data General Eclipse S	Data General microNova	Data General Nova 2	Data General Nova 3	Data General Nova 4	Data General Nova 800	Data General (other models)	Datapoint ARC
No. of User Responses	5	10	41	15	6	4	28	17	7	7	13
No. of Systems Represented	5	11	55	20	6	5	41	32	14	10	33
Avg. Life of System (Mos.)	12.0	21.3	19.6	28.6	23.3	64.7	37.5	9.1	66.0	27.0	10.8
Acquisition Method (%)											
Purchase	80.00	90.00	87.80	93.33	100.00	75.00	92.86	88.24	85.71	50.00	53.85
Rental or Lease from Mfr.	0.00	0.00	0.00	0.00	0.00	0.00	3.57	0.00	0.00	16.67	38.46
Lease from 3rd Party	20.00	10.00	12.20	6.67	0.00	25.00	3.57	11.76	14.29	33.33	7.69
Principal Applications (%)											
Accounting/Billing	80.00	90.00	70.73	60.00	66.67	75.00	67.86	41.18	14.29	71.43	61.54
Banking-check processing/loans/savings	0.00	0.00	7.32	0.00	0.00	0.00	3.57	11.76	0.00	14.29	0.00
Construction/Architecture	20.00	10.00	0.00	13.33	0.00	0.00	10.71	5.88	0.00	0.00	15.38
Education-scheduling/administration	0.00	0.00	7.32	13.33	0.00	0.00	14.29	11.76	28.57	0.00	7.69
Engineering/Scientific	0.00	0.00	14.63	46.67	16.67	0.00	3.57	11.76	14.29	42.86	7.69
Health care/Medical	20.00	0.00	2.44	6.67	0.00	0.00	10.71	11.76	0.00	0.00	0.00
Insurance	0.00	0.00	0.00	6.67	0.00	0.00	7.14	5.88	0.00	14.29	7.69
Manufacturing	60.00	30.00	31.71	13.33	0.00	0.00	21.43	0.00	0.00	0.00	15.38
Mathematics/Statistics	0.00	0.00	9.76	26.67	0.00	25.00	7.14	5.88	28.57	28.57	23.08
Order Processing/Inventory Control	80.00	70.00	56.10	33.33	50.00	50.00	42.86	23.53	14.29	28.57	38.46
Payroll/Personnel	60.00	40.00	41.46	26.67	50.00	25.00	39.29	23.53	28.57	14.29	30.77
Petroleum/Fuel analysis	20.00	0.00	0.00	6.67	0.00	0.00	0.00	0.00	0.00	0.00	7.69
Process control	0.00	0.00	2.44	6.67	0.00	0.00	0.00	11.76	14.29	0.00	7.69
Purchasing	20.00	20.00	21.95	20.00	16.67	0.00	17.86	11.76	28.57	14.29	23.08
Sales Distribution	40.00	30.00	39.02	33.33	16.67	25.00	28.57	11.76	0.00	42.86	30.77
Other	20.00	0.00	31.71	26.67	33.33	0.00	25.00	41.18	42.86	14.29	23.08
Source of Applications Programs (%)											
In-house personnel	100.00	80.00	85.37	100.00	83.33	50.00	75.00	52.94	57.14	71.43	84.26
"Ready-made" programs from manufacturer	20.00	10.00	14.63	13.33	16.67	25.00	7.14	5.88	14.29	28.57	15.38
Contract Programming	20.00	50.00	24.39	26.67	16.67	25.00	39.29	29.41	28.57	42.86	46.15
Manufacturer's Personnel	0.00	0.00	2.44	0.00	0.00	0.00	7.14	5.88	0.00	0.00	0.00
Proprietary Software Packages	20.00	70.00	39.02	33.33	16.67	50.00	28.57	41.18	14.29	71.43	30.77
Location of Computer (%)											
Distributed Processing Site	0.00	0.00	4.88	6.67	16.67	0.00	3.57	17.65	14.29	0.00	23.08
Central Processing Installation	100.00	100.00	95.12	93.33	83.33	100.00	96.43	82.35	85.71	100.00	76.92
Using Local Workstations/Terminals (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Using Remote Workstations/Terminals (%)	80.00	100.00	97.56	100.00	100.00	100.00	100.00	94.12	100.00	100.00	100.00
Using Data Base Management System (%)	0.00	0.00	51.22	26.67	33.33	0.00	28.57	11.76	14.29	42.86	7.69
None	100.00	100.00	48.78	73.33	66.67	100.00	71.43	88.24	85.71	57.14	92.31
Manufacturer's Package	0.00	0.00	60.00	0.00	50.00	0.00	50.00	50.00	0.00	0.00	0.00
Outside Vendor's Package	0.00	0.00	15.00	50.00	0.00	0.00	25.00	0.00	0.00	50.00	0.00
Home-Grown System	0.00	0.00	25.00	50.00	50.00	0.00	25.00	50.00	100.00	50.00	100.00
Using Communications Monitor (%)	40.00	10.00	31.71	33.33	16.67	0.00	14.29	29.41	42.86	42.86	15.38
None	60.00	90.00	68.29	66.67	83.33	100.00	85.71	70.59	57.14	57.14	76.92
Manufacturer's Package	100.00	100.00	58.33	20.00	0.00	0.00	50.00	75.00	33.33	0.00	0.00
Outside Vendor's Package	0.00	0.00	25.00	40.00	0.00	0.00	25.00	0.00	33.33	0.00	100.00
Home-Grown System	0.00	0.00	16.67	40.00	100.00	0.00	25.00	25.00	33.33	100.00	0.00
Using Integrated Word Processing Functions (%)	40.00	30.00	26.83	13.33	16.67	0.00	21.43	41.18	0.00	14.29	7.69
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	40.00	0.00	31.71	26.67	0.00	0.00	14.29	23.53	14.29	14.29	38.46
Proprietary Software from other suppliers	60.00	20.00	39.02	26.67	33.33	25.00	17.86	29.41	14.29	28.57	38.46
Expansions to Data Communications facilities	40.00	0.00	24.39	33.33	16.67	0.00	21.43	35.29	14.29	14.29	15.38
Distributed Processing capabilities	20.00	10.00	7.32	20.00	0.00	0.00	7.14	17.65	0.00	0.00	23.08
Expansions to present hardware	80.00	50.00	46.34	60.00	33.33	25.00	64.29	47.06	42.86	28.57	46.15
Another Computer System, same model	20.00	10.00	4.88	13.33	16.67	0.00	10.71	17.65	14.29	28.57	7.69
Integrated Word Processing capabilities	20.00	20.00	14.63	13.33	0.00	0.00	17.86	17.65	0.00	0.00	38.46
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	0.00	0.00	2.44	0.00	33.33	0.00	7.14	11.76	0.00	14.29	0.00
Yes, vendor unknown	0.00	20.00	0.00	13.33	0.00	0.00	3.57	0.00	14.29	14.29	0.00
Yes, different vendor	0.00	0.00	4.88	6.67	16.67	0.00	7.14	0.00	14.29	0.00	0.00
No	100.00	80.00	90.24	80.00	50.00	75.00	78.57	88.24	71.43	71.43	100.00

Manufacturer and Model / Survey Item	Data General CS 40, 50	Data General CS 60	Data General Eclipse C	Data General Eclipse S	Data General microNova	Data General Nova 2	Data General Nova 3	Data General Nova 4	Data General Nova 800	Data General (other models)	Datapoint ARC
Significant Advantages (%)											
Users are happy with response time	100.00	30.00	43.90	46.67	16.67	50.00	50.00	64.71	71.43	14.29	69.23
System is easy to expand/reconfigure	80.00	70.00	73.17	66.67	83.33	25.00	53.57	82.35	14.29	14.29	25.49
System costs were less than expected	40.00	20.00	14.63	6.67	33.33	25.00	25.00	11.76	0.00	14.29	15.38
Programs/data carried over from other systems are compatible, as vendor promised	20.00	20.00	26.83	6.67	50.00	0.00	21.43	41.18	0.00	28.57	53.85
Terminals/peripherals carried over from other systems are compatible, as vendor promised	0.00	20.00	21.95	13.33	16.67	0.00	21.43	47.06	14.29	14.29	23.08
System is power/energy efficient	60.00	20.00	19.51	13.33	0.00	25.00	14.29	11.76	14.29	0.00	23.08
Productivity aids help us keep programming costs down	60.00	40.00	34.15	46.67	0.00	0.00	25.00	29.41	14.29	0.00	7.69
Data base language is efficient and effective	0.00	10.00	26.83	13.33	0.00	0.00	14.29	5.88	14.29	14.29	0.00
Delivery and/or installation of equipment was ahead of schedule	0.00	20.00	14.63	13.33	0.00	0.00	7.14	0.00	0.00	14.29	7.69
Delivery of required software was ahead of schedule	20.00	20.00	14.63	6.67	0.00	0.00	3.57	11.76	0.00	0.00	0.00
Significant Problems (%)											
Computer proposed by vendor was too small	0.00	20.00	12.20	33.33	0.00	0.00	25.00	23.53	14.29	28.57	7.69
Installation of equipment was late	0.00	10.00	21.95	26.67	33.33	0.00	10.71	29.41	28.57	0.00	7.69
Delivery of required software was late	0.00	20.00	12.20	13.33	33.33	25.00	25.00	11.76	28.57	0.00	7.69
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	0.00	10.00	4.88	13.33	0.00	25.00	10.71	29.41	42.86	14.29	0.00
Vendor did not provide all the promised software or support	0.00	0.00	12.20	33.33	33.33	50.00	28.57	29.41	28.57	14.29	15.38
Program/data compatibility not what vendor promised	0.00	0.00	4.88	0.00	16.67	0.00	3.57	5.88	28.57	14.29	7.69
Terminals/peripherals compatibility not what vendor promised	0.00	0.00	4.88	13.33	16.67	0.00	0.00	0.00	0.00	0.00	0.00
Vendor enhancements/changes to hardware/software hard to keep up with	0.00	0.00	29.27	26.67	0.00	0.00	14.29	11.76	14.29	14.29	7.69
Equipment is excessively noisy	0.00	0.00	14.63	6.67	0.00	0.00	7.14	29.41	14.29	0.00	23.08
Power and/or cooling requirements are excessive	0.00	0.00	17.07	20.00	0.00	25.00	3.57	5.88	14.29	0.00	0.00
System Ratings (4.0-0.0)											
Ease of operation	3.80	3.90	3.35	3.53	3.20	3.00	3.39	3.41	2.86	2.86	3.69
Reliability of Mainframe	3.60	3.90	3.22	3.60	3.50	3.00	3.25	3.41	3.00	3.14	3.54
Reliability of Peripherals	3.20	3.10	2.93	3.07	3.17	3.00	3.00	3.00	2.86	2.86	3.38
Maintenance service:											
Responsiveness	3.40	3.60	2.63	2.47	3.33	2.25	2.82	2.94	2.43	3.00	3.38
Effectiveness	3.20	3.50	2.59	2.60	3.00	2.25	2.73	2.88	2.86	2.71	3.23
Technical support:											
Trouble-shooting	2.60	2.80	2.35	2.40	2.17	1.67	2.48	2.76	2.43	2.14	2.54
Education	3.00	2.70	2.55	2.73	2.00	2.00	2.14	2.67	2.00	2.43	2.46
Documentation	3.00	2.90	2.49	2.53	2.00	2.26	2.53	2.00	2.29	2.29	2.00
Manufacturer's software:											
Operating system	3.50	3.33	3.26	3.17	3.00	2.33	2.92	3.12	2.83	2.71	3.23
Compilers & Assemblers	3.50	3.75	3.03	2.83	3.00	2.33	2.86	3.07	2.67	2.67	3.15
Applications Programs	3.00	1.00	2.74	2.88	2.33	1.00	2.27	3.29	2.60	2.75	3.00
Ease of Programming	3.80	3.75	3.16	3.36	3.00	2.00	3.12	3.27	2.50	2.83	3.00
Ease of conversion	3.00	3.67	2.94	2.36	3.50	1.00	2.70	3.50	2.33	2.83	3.46
Overall satisfaction	3.20	3.44	2.95	3.13	2.67	2.50	2.92	3.18	2.50	3.00	3.23
Did the system do what you expected it to do? (%)											
Yes	80.00	90.00	85.37	86.67	83.33	50.00	82.14	88.24	71.43	71.43	100.00
No	0.00	0.00	4.88	6.67	16.67	25.00	10.71	5.88	28.57	28.57	0.00
Haven't decided	20.00	10.00	9.76	6.67	0.00	25.00	7.14	5.88	0.00	0.00	0.00
Would you recommend system to another user? (%)											
Yes	80.00	80.00	65.85	73.33	66.67	50.00	71.43	82.35	42.86	100.00	100.00
No	0.00	0.00	12.20	6.67	16.67	25.00	14.29	5.88	57.14	0.00	0.00
Haven't decided	20.00	20.00	21.95	20.00	16.67	25.00	14.29	11.76	0.00	0.00	0.00

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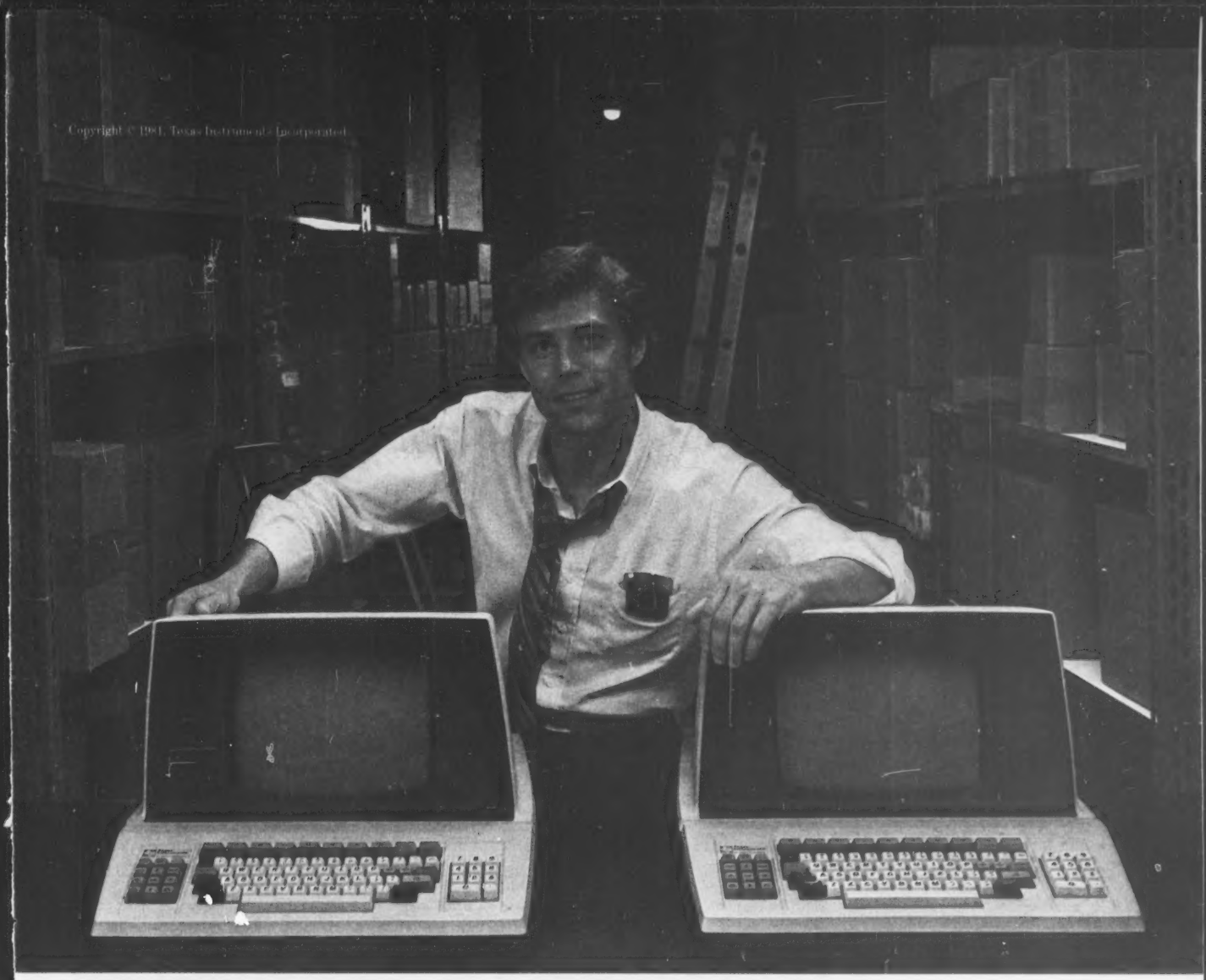

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TEXAS INSTRUMENTS
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Survey Item	Datapoint 1500	Datapoint 1800	Datapoint 5500	Datapoint 6600	Datapoint (other models)	DEC Datasystem 300	DEC Datasystem 500	DEC LSI-11	DEC PDP-8	DEC PDP-11/03	DEC PDP-11/23
No. of User Responses	7	7	4	20	9	8	4	6	6	10	13
No. of Systems Represented	9	15	8	37	22	10	4	10	11	17	14
Avg. Life of System (Mos.)	14.7	9.3	45.0	13.9	31.4	22.8	17.3	21.8	48.3	24.3	7.6
Acquisition Method (%)											
Purchase	57.14	57.14	50.00	60.00	77.78	75.00	75.00	83.33	83.33	100.00	100.00
Rental or Lease from Mfr.	14.29	42.86	25.00	35.00	22.22	12.50	0.00	0.00	0.00	0.00	0.00
Lease from 3rd Party	28.57	0.00	25.00	5.00	0.00	12.50	25.00	16.67	16.67	0.00	0.00
Principal Applications (%)											
Accounting/Billing	57.14	85.71	75.00	80.00	77.78	100.00	75.00	16.67	50.00	30.00	76.92
Banking-check processing/loans/savings	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00
Construction/Architecture	0.00	0.00	0.00	15.00	11.11	0.00	25.00	0.00	0.00	0.00	0.00
Education-scheduling/administration	0.00	0.00	0.00	0.00	11.11	0.00	0.00	0.00	0.00	0.00	7.69
Engineering/Scientific	14.29	0.00	0.00	5.00	11.11	0.00	0.00	33.33	0.00	40.00	30.77
Health care/Medical	14.29	14.29	0.00	0.00	11.11	12.50	0.00	0.00	16.67	40.00	15.38
Insurance	0.00	14.29	0.00	66.67	0.00	0.00	25.00	0.00	0.00	10.00	0.00
Manufacturing	14.29	42.86	25.00	30.00	22.22	0.00	0.00	0.00	0.00	0.00	0.00
Mathematics/Statistics	0.00	0.00	0.00	5.00	33.33	0.00	0.00	16.67	16.67	30.00	7.69
Order Processing/Inventory Control	42.86	57.14	25.00	60.00	55.56	37.50	0.00	0.00	16.67	20.00	23.08
Payroll/Personnel	14.29	42.86	50.00	40.00	33.33	62.50	75.00	0.00	50.00	10.00	46.15
Petroleum/Fuel analysis	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Process control	0.00	28.57	0.00	5.00	0.00	12.50	0.00	0.00	0.00	0.00	0.00
Purchasing	14.29	28.57	0.00	11.76	11.11	12.50	0.00	0.00	0.00	0.00	15.38
Sales Distribution	28.57	57.14	50.00	40.00	33.33	37.50	0.00	16.67	16.67	0.00	23.08
Other	57.14	57.14	25.00	30.00	0.00	0.00	50.00	50.00	33.33	70.00	30.77
Source of Applications Programs (%)											
In-house personnel	57.14	85.71	50.00	80.00	88.89	37.50	75.00	83.33	50.00	100.00	53.85
"Ready-made" programs from manufacturer	14.29	0.00	0.00	5.00	33.33	25.00	25.00	33.33	0.00	30.00	28.08
Contract Programming	28.57	28.57	25.00	50.00	33.33	50.00	0.00	16.67	16.67	10.00	15.38
Manufacturer's Personnel	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00
Proprietary Software Packages	14.29	57.14	75.00	35.00	33.33	62.50	50.00	50.00	50.00	40.00	46.15
Location of Computer (%)											
Distributed Processing Site	14.29	42.86	25.00	20.00	33.33	37.50	0.00	33.33	16.67	10.00	0.00
Central Processing Installation	85.71	57.14	75.00	80.00	66.67	62.50	100.00	66.67	83.33	90.00	100.00
Using Local Workstations/Terminals (%)	100.00	85.71	100.00	100.00	88.89	100.00	100.00	100.00	100.00	100.00	100.00
Using Remote Workstations/Terminals (%)	85.71	100.00	100.00	100.00	100.00	87.50	100.00	100.00	100.00	100.00	100.00
Using Data Base Management System (%)	0.00	14.29	0.00	10.00	66.67	25.00	25.00	16.67	16.67	40.00	23.08
None	100.00	85.71	100.00	90.00	33.33	75.00	75.00	83.33	83.33	60.00	76.92
Manufacturer's Package	0.00	0.00	0.00	50.00	33.33	0.00	100.00	0.00	0.00	0.00	0.00
Outside Vendor's Package	0.00	0.00	0.00	0.00	33.33	100.00	0.00	100.00	0.00	25.00	100.00
Home-Grown System	0.00	33.33	0.00	50.00	33.33	0.00	0.00	0.00	100.00	75.00	0.00
Using Communications Monitor (%)	28.57	100.00	25.00	25.00	77.78	37.50	50.00	0.00	16.67	0.00	23.08
None	71.43	0.00	75.00	65.00	22.22	62.50	50.00	100.00	83.33	100.00	76.92
Manufacturer's Package	0.00	0.00	0.00	0.00	85.71	100.00	50.00	0.00	0.00	0.00	50.00
Outside Vendor's Package	100.00	100.00	100.00	60.00	14.29	0.00	50.00	0.00	0.00	0.00	50.00
Home-Grown System	0.00	0.00	0.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Using Integrated Word Processing Functions (%)	28.57	57.14	0.00	15.00	22.22	25.00	0.00	50.00	16.67	80.00	61.54
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	28.57	57.14	25.00	15.00	44.44	12.50	0.00	0.00	16.67	10.00	7.69
Proprietary Software from other suppliers	42.86	57.14	25.00	30.00	22.22	37.50	25.00	50.00	16.67	30.00	38.46
Expansions to Data Communications facilities	42.86	28.57	25.00	30.00	22.22	37.50	0.00	16.67	16.67	10.00	23.08
Distributed Processing capabilities	0.00	42.86	25.00	25.00	33.33	0.00	0.00	0.00	0.00	10.00	15.38
Expansions to present hardware	28.57	42.86	25.00	65.00	88.89	50.00	50.00	66.67	0.00	60.00	53.85
Another Computer System, same model	14.29	14.29	25.00	10.00	22.22	0.00	0.00	16.67	16.67	30.00	7.69
Integrated Word Processing capabilities	0.00	42.86	0.00	20.00	11.11	12.50	0.00	16.67	0.00	10.00	15.38
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	0.00	0.00	0.00	0.00	0.00	25.00	0.00	33.33	16.67	30.00	23.08
Yes, vendor unknown	14.29	0.00	0.00	0.00	11.11	0.00	0.00	0.00	16.67	0.00	0.00
Yes, different vendor	0.00	14.29	25.00	5.00	0.00	0.00	0.00	16.67	0.00	10.00	0.00
No	85.71	85.71	75.00	95.00	88.89	75.00	100.00	50.00	50.00	50.00	76.92

Manufacturer and Model / Survey Item	Datapoint 1500	Datapoint 1800	Datapoint 5500	Datapoint 6600	Datapoint (other models)	DEC Datasystem 300	DEC Datasystem 500	DEC LSI-11	DEC PDP-8	DEC PDP-11/03	DEC PDP-11/23
Significant Advantages (%)											
Users are happy with response time	42.86	42.86	25.00	65.00	55.56	75.00	25.00	33.33	16.67	30.00	53.85
System is easy to expand/reconfigure	57.14	57.14	25.00	90.00	55.56	62.50	50.00	83.33	16.67	60.00	84.62
System costs were less than expected	28.57	57.14	50.00	10.00	33.33	12.50	0.00	16.67	16.67	20.00	7.69
Programs/data carried over from other systems are compatible, as vendor promised	42.86	57.14	25.00	45.00	22.22	25.00	0.00	50.00	0.00	40.00	38.46
Terminals/peripherals carried over from other systems are compatible, as vendor promised	14.29	28.57	0.00	20.00	0.00	37.50	25.00	16.67	16.67	30.00	46.15
System is power/energy efficient	14.29	28.57	0.00	30.00	11.11	12.50	0.00	33.33	0.00	30.00	30.77
Productivity aids help us keep programming costs down	42.86	57.14	0.00	25.00	22.22	37.50	25.00	33.33	0.00	20.00	0.00
Data base language is efficient and effective	14.29	14.29	0.00	25.00	0.00	12.50	0.00	0.00	0.00	20.00	7.69
Delivery and/or installation of equipment was ahead of schedule	28.57	28.57	0.00	10.00	11.11	25.00	0.00	16.67	16.67	20.00	0.00
Delivery of required software was ahead of schedule	28.57	28.57	0.00	0.00	0.00	12.50	0.00	16.67	0.00	0.00	0.00
Significant Problems (%)											
Computer proposed by vendor was too small	0.00	14.29	25.00	5.00	33.33	12.50	0.00	0.00	33.33	0.00	0.00
Installation of equipment was late	28.57	28.57	0.00	20.00	0.00	25.00	50.00	16.67	0.00	20.00	15.38
Delivery of required software was late	0.00	14.29	0.00	15.00	11.11	0.00	25.00	16.67	0.00	30.00	7.69
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	7.69
Vendor did not provide all the promised software or support	0.00	0.00	0.00	10.00	0.00	0.00	25.00	0.00	33.33	0.00	7.69
Program/data compatibility not what vendor promised	0.00	0.00	0.00	0.00	0.00	12.50	25.00	0.00	0.00	0.00	0.00
Terminals/peripherals compatibility not what vendor promised	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor enhancements/changes to hardware/software hard to keep up with	0.00	0.00	0.00	25.00	11.11	0.00	0.00	0.00	16.67	10.00	7.69
Equipment is excessively noisy	0.00	14.29	0.00	0.00	0.00	0.00	0.00	16.67	0.00	10.00	7.69
Power and/or cooling requirements are excessive	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	15.38
System Ratings (4.0-0.0)											
Ease of operation	3.57	3.43	3.50	3.80	3.44	3.50	3.00	3.00	2.80	3.56	3.77
Reliability of Mainframe	3.71	3.29	3.75	3.65	3.22	3.63	3.25	3.33	3.67	3.70	3.62
Reliability of Peripherals	3.29	3.14	3.50	3.10	2.67	3.57	2.50	3.17	3.33	3.30	3.38
Maintenance service:											
Responsiveness	3.86	3.29	3.25	3.05	3.44	3.38	2.75	3.33	2.83	2.25	3.27
Effectiveness	3.71	3.14	2.50	3.10	2.67	3.38	2.25	3.33	2.83	2.25	3.00
Technical support:											
Trouble-shooting	3.14	2.57	2.50	2.65	2.22	3.13	2.50	3.20	2.33	2.38	2.40
Education	3.00	2.86	2.25	2.84	2.11	2.50	3.00	3.50	2.17	2.44	2.30
Documentation	2.67	2.71	2.00	2.60	2.11	2.88	2.50	3.00	1.83	3.00	2.82
Manufacturer's software:											
Operating system	3.50	3.00	2.25	3.32	2.67	3.43	3.00	2.80	3.33	3.50	3.15
Compilers & Assemblers	3.71	3.00	2.50	3.32	2.88	3.50	2.75	2.80	3.00	3.10	3.00
Applications Programs	3.50	2.50	1.50	2.73	2.71	3.50	2.67	2.67	2.80	3.00	2.83
Ease of Programming	3.57	3.29	2.25	3.35	2.67	3.38	3.00	2.83	3.25	3.30	3.09
Ease of conversion	3.00	2.43	2.00	3.07	2.22	3.17	2.00	2.80	2.00	3.00	2.75
Overall satisfaction	3.57	3.14	2.50	3.15	2.67	3.38	2.75	3.00	2.60	3.20	3.42
Did the system do what you expected it to do? (%)											
Yes	85.71	71.43	50.00	95.00	66.67	100.00	50.00	100.00	100.00	90.00	92.31
No	0.00	0.00	0.00	0.00	11.11	0.00	0.00	0.00	0.00	10.00	0.00
Haven't decided	14.29	28.57	50.00	50.00	22.22	0.00	50.00	0.00	0.00	0.00	7.69
Would you recommend system to another user? (%)											
Yes	100.00	71.43	50.00	90.00	66.67	100.00	50.00	100.00	83.33	100.00	92.31
No	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00
Haven't decided	0.00	28.57	25.00	10.00	33.33	0.00	50.00	0.00	0.00	0.00	7.69

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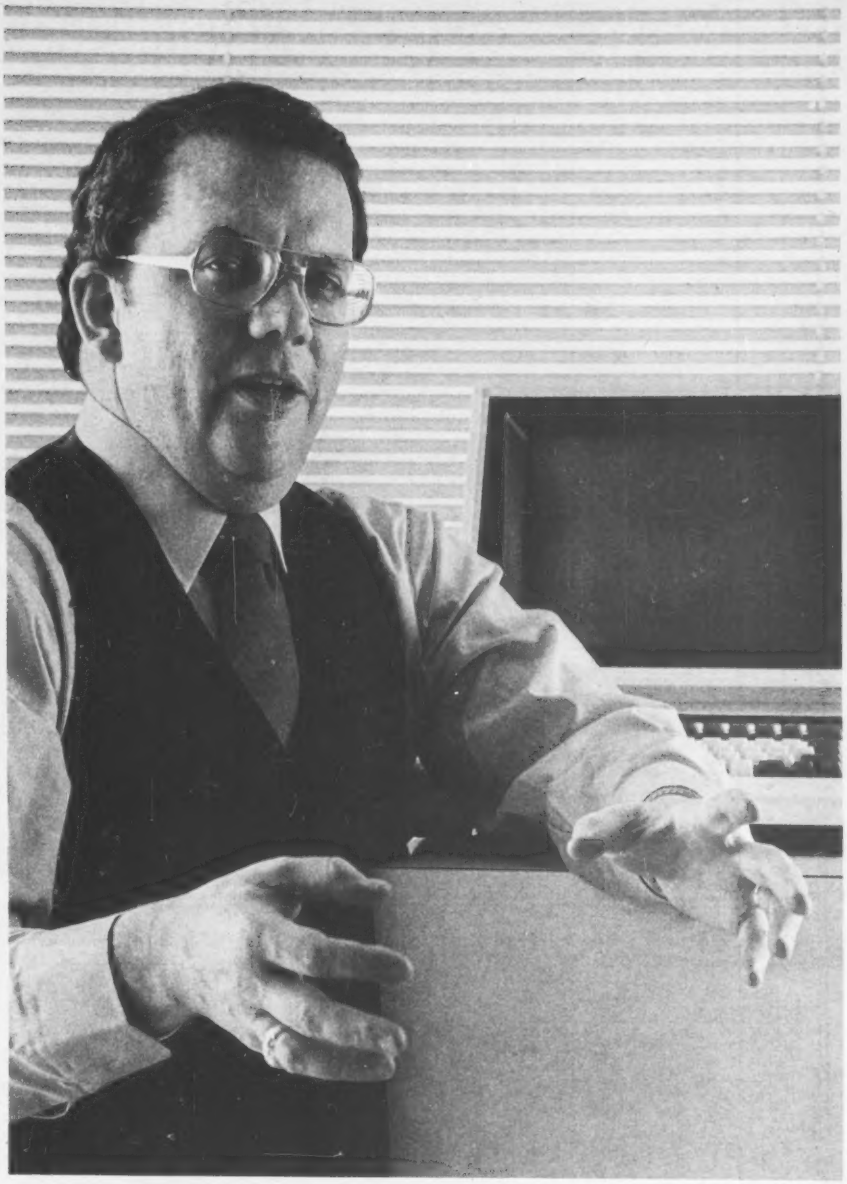
"DPS 6 is simply too big an idea to be called a minicomputer."

Hank Haugland, Director,
Small Systems Marketing,
Honeywell Information Systems



With DPS 6, Honeywell has set a new standard for small business systems.

Small systems that combine power, flexibility, growth potential, and cost effectiveness.

Consider.

The new DPS 6 family includes ten models.

At the low end there are 16-bit systems with power and capability heretofore associated with much larger computers. At the top end there are 32-bit systems that we believe are the most powerful ever announced for business applications. And in between, systems that keep adding incremental value to support different kinds of growth.

All of these systems are compatible.

Programs that run on the smallest 16-bit system also run on the largest 32-bit model. Without modification.

What's more, the larger 16-bit computers can be quickly converted into 32-bit systems when you decide you need them.

DPS 6 is ideally suited to deal with the hard, unpredictable realities of modern business.

"Everything about DPS 6 says: Here are systems built for business."

DPS 6 also includes COBOL, transaction processing, word processing, data entry and communications. A package that experts are calling the best business-oriented software available today. And it should be. Honeywell has been helping business solve tough problems for 25 years.

Over time, we have combined our proven hardware, software, and human expertise into a highly efficient tool: Businessware. It's more than a word. It's a way to pit our vast resources against the jobs business needs done.

"DPS 6 is designed to meet the business challenges of the 80s head-on."

Naturally, DPS 6 works splendidly in distributed environments, providing data where it's needed to ensure greater productivity right on down the line.

DPS 6 systems are easy to install and maintain. And so simple to expand that unexpected growth won't be a problem.

It all comes down to this.

Why settle for minicomputers when you can have DPS 6?

For more information on our new family of small systems write Honeywell, 200 Smith St. (MS 487), Waltham, Massachusetts 02154.

Honeywell

The ingenuity of people, the power of computers.

. . . Users Rate Their Minis

Manufacturer and Model / Survey Item	DEC PDP-11/34	DEC PDP-11/40	DEC PDP-11/45	DEC PDP-11/60	DEC PDP-11/70	DEC VAX	DEC (other models)	Four Phase IV 90	Four Phase (other models)	General Automation SPC-16	General Automation 18/30
No. of User Responses	79	7	18	8	93	28	14	14	13	7	5
No. of Systems Represented	108	11	22	8	143	37	20	20	15	8	5
Avg. Life of System (Mos.)	29.3	60.6	42.7	18.5	29.3	10.9	36.4	28.3	31.2	55.0	66.2
Acquisition Method (%)											
Purchase	79.22	71.43	88.24	71.43	74.19	75.00	85.71	21.43	21.43	71.43	80.00
Rental or Lease from Mfr	2.60	14.29	0.00	0.00	9.68	3.57	0.00	64.29	64.29	14.29	20.00
Lease from 3rd Party	18.18	14.29	11.76	28.57	16.13	21.43	14.29	14.29	14.29	14.29	0.00
Principal Applications (%)											
Accounting/Billing	55.43	71.43	55.56	37.50	58.06	32.14	64.29	71.43	84.62	57.14	60.00
Banking-check processing/loans/savings	3.80	0.00	0.00	0.00	3.23	0.00	0.00	0.00	0.00	0.00	0.00
Construction/Architecture	2.53	0.00	0.00	12.50	3.23	3.57	7.14	0.00	0.00	0.00	40.00
Education-scheduling/administration	8.86	0.00	33.33	12.50	13.98	7.14	14.29	0.00	0.00	28.57	40.00
Engineering/Scientific	15.19	28.57	33.33	12.50	23.66	46.43	35.71	14.29	0.00	28.57	40.00
Health care/Medical	10.13	0.00	5.56	37.50	9.68	0.00	7.14	28.57	46.15	0.00	0.00
Insurance	3.80	0.00	5.56	0.00	5.38	0.00	7.14	14.29	7.69	0.00	0.00
Manufacturing	12.66	0.00	16.67	0.00	9.68	17.86	14.29	28.57	15.38	42.86	0.00
Mathematics/Statistics	10.13	14.29	33.33	0.00	23.66	28.57	14.29	7.14	0.00	28.57	0.00
Order Processing/Inventory Control	35.44	42.86	22.22	25.00	36.56	10.71	21.43	57.14	38.46	42.86	0.00
Payroll/Personnel	27.85	42.86	27.78	37.50	36.56	17.86	50.00	42.86	69.23	28.57	60.00
Petroleum/Fuel analysis	0.00	0.00	0.00	0.00	4.30	3.57	0.00	0.00	0.00	0.00	0.00
Process control	7.59	0.00	0.00	0.00	4.30	7.14	0.00	0.00	0.00	0.00	0.00
Purchasing	17.72	14.29	22.22	12.50	18.28	3.57	21.43	35.71	30.77	28.57	0.00
Sales Distribution	26.58	42.86	16.67	25.00	18.28	7.14	7.14	35.71	7.69	28.57	0.00
Other	26.58	14.29	16.67	37.50	30.11	50.00	28.57	21.43	23.08	14.29	20.00
Source of Applications Programs (%)											
In-house personnel	77.22	85.71	94.44	87.50	82.80	82.14	71.43	85.71	53.85	85.71	80.00
"Ready-made" programs from manufacturer	13.92	28.57	27.78	12.50	31.18	35.71	35.71	21.43	23.08	42.86	20.00
Contract Programming	26.58	42.86	22.22	12.50	35.48	21.43	28.57	28.57	30.77	42.86	0.00
Manufacturer's Personnel	1.27	0.00	0.00	0.00	5.38	0.00	7.14	0.00	0.00	14.29	0.00
Proprietary Software Packages	39.24	0.00	33.33	25.00	49.46	71.43	42.86	28.57	46.15	28.57	40.00
Location of Computer (%)											
Distributed Processing Site	10.39	0.00	27.78	12.50	8.60	0.00	14.29	57.14	61.54	0.00	0.00
Central Processing Installation	89.61	100.00	72.22	87.50	91.40	100.00	85.71	42.86	38.46	100.00	100.00
Using Local Workstations/Terminals (%)	98.73	100.00	100.00	100.00	98.92	100.00	100.00	100.00	100.00	100.00	60.00
Using Remote Workstations/Terminals (%)	97.47	85.71	100.00	100.00	96.77	89.29	100.00	100.00	100.00	28.57	40.00
Using Data Base Management System (%)	37.71	28.57	38.89	62.50	45.16	42.86	42.86	7.14	30.77	28.57	40.00
None	62.29	71.43	61.11	37.50	54.84	57.14	57.14	92.86	69.23	71.43	60.00
Manufacturer's Package	37.04	50.00	28.57	20.00	40.48	8.33	0.00	100.00	66.67	50.00	0.00
Outside Vendor's Package	29.63	0.00	28.57	60.00	35.71	58.33	100.00	0.00	33.33	0.00	100.00
Home-Grown System	33.33	50.00	42.86	20.00	23.81	33.33	0.00	0.00	0.00	50.00	0.00
Using Communications Monitor (%)	15.19	57.14	27.78	25.00	35.48	28.57	35.71	50.00	30.77	0.00	20.00
None	84.81	42.86	72.22	75.00	64.52	71.43	64.29	50.00	69.23	100.00	80.00
Manufacturer's Package	54.55	66.67	60.00	0.00	64.00	75.00	25.00	100.00	50.00	0.00	0.00
Outside Vendor's Package	18.18	33.33	40.00	50.00	16.00	12.50	50.00	0.00	50.00	0.00	0.00
Home-Grown System	27.27	0.00	0.00	50.00	10.00	12.50	25.00	0.00	0.00	0.00	0.00
Using Integrated Word Processing Functions (%)	30.38	28.57	44.44	12.50	26.88	46.23	50.00	64.29	7.69	28.57	20.00
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	12.66	0.00	16.67	0.00	16.13	46.43	14.29	42.86	46.15	0.00	0.00
Proprietary Software from other suppliers	30.38	28.57	55.56	12.50	40.86	42.86	35.71	7.14	7.69	0.00	0.00
Expansions to Data Communications facilities	20.25	14.29	27.78	12.50	35.48	42.86	7.14	28.57	23.08	28.57	0.00
Distributed Processing capabilities	7.59	14.29	11.11	25.00	8.60	21.43	0.00	21.43	23.08	14.29	0.00
Expansions to present hardware	44.30	28.57	61.11	37.50	48.39	75.00	35.71	42.86	61.54	28.57	0.00
Another Computer System, same model	11.39	0.00	0.00	12.50	11.83	21.43	14.29	7.14	0.00	14.29	0.00
Integrated Word Processing capabilities	7.59	14.29	22.22	25.00	12.90	14.29	7.14	7.14	30.77	0.00	20.00
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	13.92	14.29	16.67	0.00	4.30	0.00	35.71	0.00	23.08	0.00	0.00
Yes, vendor unknown	1.27	0.00	0.00	0.00	0.00	0.00	7.14	7.14	7.69	14.29	40.00
Yes, different vendor	2.53	0.00	0.00	0.00	5.38	0.00	7.14	0.00	0.00	28.57	20.00
No	82.28	85.71	83.33	100.00	90.32	100.00	42.86	85.71	69.23	57.14	40.00

Manufacturer and Model / Survey Item	DEC PDP-11/34	DEC PDP-11/40	DEC PDP-11/45	DEC PDP-11/60	DEC PDP-11/70	DEC VAX	DEC (other models)	Four Phase IV 90	Four Phase (other models)	General Automation SPC-16	General Automation 18/30
Significant Advantages (%)											
Users are happy with response time	62.03	57.14	66.67	50.00	72.04	82.14	64.29	57.14	61.54	14.29	40.00
System is easy to expand/reconfigure	56.96	57.14	100.00	62.50	64.52	67.86	50.00	50.00	69.23	14.29	0.00
System costs were less than expected	11.39	0.00	11.11	12.50	16.13	14.29	14.29	28.57	23.08	0.00	0.00
Programs/data carried over from other systems are compatible, as vendor promised	10.13	14.29	44.44	37.50	25.81	60.71	7.14	21.43	23.08	28.57	60.00
Terminals/peripherals carried over from other systems are compatible, as vendor promised	13.92	0.00	50.00	25.00	29.03	57.14	7.14	14.29	23.08	14.29	20.00
System is power/energy efficient	12.66	0.00	11.11	25.00	18.28	17.86	14.29	14.29	23.08	14.29	20.00
Productivity aids help us keep programming costs down	18.99	0.00	22.22	37.50	33.33	50.00	35.71	21.43	30.77	0.00	20.00
Data base language is efficient and effective	13.92	14.29	22.22	50.00	18.28	10.71	21.43	14.29	7.69	0.00	20.00
Delivery and/or installation of equipment was ahead of schedule	6.33	0.00	5.56	12.50	9.68	25.00	7.14	14.29	0.00	0.00	0.00
Delivery of required software was ahead of schedule	3.80	0.00	0.00	0.00	33.33	14.29	7.14	14.29	7.69	0.00	0.00
Significant Problems (%)											
Computer proposed by vendor was too small	12.66	0.00	0.00	25.00	11.83	3.57	0.00	0.00	7.69	14.29	0.00
Installation of equipment was late	17.72	42.86	27.78	25.00	15.05	32.14	7.14	7.14	7.69	0.00	0.00
Delivery of required software was late	18.99	14.29	0.00	0.00	13.98	17.86	14.29	21.43	0.00	14.29	20.00
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	11.39	0.00	5.56	12.50	11.83	3.57	7.14	7.14	7.69	42.86	20.00
Vendor did not provide all the promised software or support	16.46	14.29	5.56	25.00	17.20	3.57	7.14	35.71	23.08	71.43	40.00
Program/data compatibility not what vendor promised	2.53	0.00	0.00	0.00	3.23	0.00	0.00	7.14	7.69	14.29	0.00
Terminals/peripherals compatibility not what vendor promised	3.80	0.00	0.00	0.00	0.00	7.14	0.00	0.00	0.00	14.29	0.00
Vendor enhancements/changes to hardware/software hard to keep up with	17.72	0.00	5.56	0.00	9.68	10.71	14.29	14.29	0.00	42.86	0.00
Equipment is excessively noisy	11.39	0.00	0.00	0.00	7.53	10.71	7.14	7.14	7.69	14.29	20.00
Power and/or cooling requirements are excessive	7.59	0.00	0.00	0.00	7.53	17.86	0.00	0.00	7.69	0.00	20.00
System Ratings (4.0-0.0)											
Ease of operation	3.42	3.29	3.83	3.63	3.44	3.71	3.43	3.36	3.62	2.57	2.80
Reliability of Mainframe	3.54	3.43	3.67	3.25	3.49	3.64	3.57	3.46	3.38	3.57	3.20
Reliability of Peripherals	3.27	3.29	3.11	3.13	3.13	3.07	3.57	3.23	3.23	2.57	2.60
Maintenance service:											
Responsiveness	3.24	3.29	3.00	3.43	3.14	3.04	2.93	3.14	3.31	2.43	2.20
Effectiveness	3.10	2.86	2.78	3.14	2.96	2.93	3.00	3.08	3.08	3.00	2.75
Technical support:											
Trouble-shooting	2.80	2.86	2.35	3.00	2.64	2.78	2.85	2.38	2.92	2.00	2.00
Education	2.64	2.43	2.65	3.00	2.54	2.85	2.67	2.54	2.83	1.83	1.75
Documentation	2.67	2.50	3.00	2.57	2.67	3.04	2.62	2.54	2.62	2.00	2.00
Manufacturer's software:											
Operating system	3.40	3.43	3.76	3.40	3.33	3.50	3.38	2.77	3.30	1.86	2.60
Compilers & Assemblers	3.13	3.20	3.53	3.00	3.08	3.50	3.08	2.77	3.33	2.14	2.80
Applications Programs	2.77	3.00	3.22	3.25	2.58	3.10	3.00	2.75	3.27	1.67	2.50
Ease of Programming	3.23	3.43	3.67	3.63	3.18	3.57	3.23	2.77	3.44	2.17	2.80
Ease of conversion	2.75	2.83	3.38	3.25	2.82	3.38	3.10	2.75	3.40	2.00	2.75
Overall satisfaction	3.21	3.14	3.39	3.50	3.13	3.54	3.31	3.07	3.23	1.86	2.60
Did the system do what you expected it to do? (%)											
Yes	91.14	85.71	88.89	75.00	95.70	92.86	85.71	85.71	84.62	57.14	80.00
No	2.53	0.00	0.00	0.00	3.23	0.00	0.00	7.14	0.00	14.29	0.00
Haven't decided	5.06	14.29	5.56	25.00	1.08	7.14	14.29	7.14	15.38	28.57	20.00
Would you recommend system to another user? (%)											
Yes	83.54	85.71	83.33	75.00	88.17	89.29	78.57	78.57	84.62	14.29	20.00
No	3.80	0.00	5.56	25.00	7.53	3.57	7.14	7.14	0.00	71.43	80.00
Haven't decided	11.39	14.29	5.56	0.00	3.23	7.14	14.29	14.29	15.38	14.29	0.00

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. . . And Their Manufacturers

Survey Item \ Manufacturer and Model	Harris 100/200	Harris (other models)	Hewlett-Packard 250	Hewlett-Packard 1000	Hewlett-Packard 3000	Hewlett-Packard 3000 II	Hewlett-Packard 3000 III	Hewlett-Packard 3000 30	Hewlett-Packard 3000 33	Hewlett-Packard (other models)	Honeywell Level 6
No. of User Responses	9	4	7	16	36	14	67	13	12	8	25
No. of Systems Represented	9	4	7	26	43	17	83	18	12	11	40
Avg. Life of System (Mos.)	39.4	51.0	10.3	21.2	24.6	40.4	22.6	8.6	12.0	15.0	17.3
Acquisition Method (%)											
Purchase	77.78	25.00	71.43	100.00	75.00	78.57	77.61	61.54	33.33	100.00	79.17
Rental or Lease from Mfr.	0.00	75.00	14.29	0.00	2.78	21.43	7.46	15.38	16.67	0.00	0.00
Lease from 3rd Party	22.22	0.00	14.29	0.00	22.22	0.00	14.93	23.08	50.00	0.00	20.83
Principal Applications (%)											
Accounting/Billing	77.78	50.00	71.43	37.50	77.78	64.29	80.60	69.23	75.00	37.50	56.00
Banking-check processing/loans/savings	25.00	0.00	0.00	0.00	5.56	0.00	5.97	0.00	8.33	0.00	4.00
Construction/Architecture	0.00	0.00	28.57	6.25	5.56	7.14	4.48	7.69	0.00	12.50	4.00
Education-scheduling/administration	66.67	25.00	0.00	0.00	16.67	28.57	5.97	0.00	8.33	37.50	4.00
Engineering/Scientific	11.11	25.00	14.29	43.75	11.11	7.14	13.43	7.69	0.00	25.00	4.00
Health care/Medical	22.22	0.00	0.00	0.00	13.89	21.43	10.45	0.00	8.33	25.00	4.00
Insurance	11.11	25.00	0.00	0.00	2.78	14.29	11.94	0.00	8.33	12.50	44.00
Manufacturing	11.11	0.00	42.86	6.25	41.67	14.29	26.87	30.77	25.00	0.00	0.00
Mathematics/Statistics	0.00	25.00	0.00	12.50	11.11	7.14	10.45	7.69	8.33	37.50	20.00
Order Processing/Inventory Control	55.56	25.00	57.14	18.75	55.56	28.57	49.25	46.15	50.00	25.00	0.00
Payroll/Personnel	11.11	50.00	57.14	43.75	47.22	35.71	61.19	46.15	33.33	12.50	40.00
Petroleum/Fuel analysis	88.89	75.00	0.00	0.00	0.00	0.00	5.97	7.69	0.00	0.00	36.00
Process control	11.11	0.00	0.00	6.25	2.78	0.00	2.99	0.00	0.00	0.00	0.00
Purchasing	11.11	0.00	28.57	6.25	33.33	28.57	11.56	30.77	41.67	12.50	4.00
Sales Distribution	0.00	25.00	57.14	0.00	33.33	28.57	25.37	30.77	8.33	12.50	12.00
Other	0.00	25.00	14.29	25.00	22.22	28.57	19.40	30.77	25.00	0.00	28.00
Source of Applications Programs (%)											
In-house personnel	77.78	100.00	57.14	81.25	75.00	85.71	91.04	84.62	66.67	100.00	76.00
"Ready-made" programs from manufacturer	0.00	0.00	57.14	6.25	22.22	21.43	26.87	23.08	16.67	37.50	4.00
Contract Programming	22.22	0.00	28.57	50.00	27.78	50.00	40.30	30.77	41.67	25.00	48.00
Manufacturer's Personnel	0.00	0.00	0.00	0.00	5.56	0.00	1.49	7.69	0.00	0.00	4.00
Proprietary Software Packages	44.44	25.00	42.86	25.00	52.78	21.43	47.76	69.23	41.67	0.00	16.00
Location of Computer (%)											
Distributed Processing Site	11.11	75.00	0.00	6.25	2.78	0.00	13.43	30.77	0.00	12.50	24.00
Central Processing Installation	88.89	25.00	100.00	93.75	97.22	100.00	86.57	69.23	100.00	87.50	76.00
Using Local Workstations/Terminals (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Using Remote Workstations/Terminals (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.62	100.00	100.00	96.00
Using Data Base Management System (%)	55.56	50.00	100.00	81.25	83.33	85.71	92.54	84.62	75.00	50.00	36.00
None	44.44	50.00	0.00	18.75	16.67	14.29	7.46	15.38	25.00	50.00	64.00
Manufacturer's Package	0.00	50.00	100.00	100.00	90.00	91.67	100.00	100.00	100.00	100.00	57.14
Outside Vendor's Package	100.00	50.00	0.00	0.00	3.33	0.00	0.00	0.00	0.00	0.00	14.29
Home-Grown System	0.00	0.00	0.00	0.00	6.67	8.33	0.00	0.00	0.00	100.00	28.57
Using Communications Monitor (%)	77.78	75.00	0.00	18.75	33.33	35.71	49.25	23.08	33.33	25.00	48.00
None	22.22	25.00	100.00	81.25	66.67	64.29	50.75	76.92	66.67	75.00	52.00
Manufacturer's Package	100.00	100.00	0.00	100.00	81.82	50.00	90.32	100.00	100.00	50.00	55.56
Outside Vendor's Package	0.00	0.00	0.00	0.00	18.18	50.00	6.45	0.00	0.00	0.00	33.33
Home-Grown System	0.00	0.00	0.00	0.00	0.00	0.00	3.23	0.00	0.00	50.00	11.11
Using Integrated Word Processing Functions (%)	22.22	25.00	71.43	12.50	27.78	14.29	26.87	30.77	33.33	62.50	32.00
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	44.44	25.00	71.43	31.25	25.00	28.57	37.31	15.38	41.67	25.00	12.00
Proprietary Software from other suppliers	44.44	0.00	57.14	25.00	52.78	28.57	38.81	38.46	50.00	12.50	24.00
Expansions to Data Communications facilities	44.44	0.00	57.14	12.50	38.89	28.57	41.79	30.77	58.33	12.50	28.00
Distributed Processing capabilities	11.11	0.00	14.29	0.00	16.67	0.00	10.45	0.00	33.33	12.50	8.00
Expansions to present hardware	44.44	50.00	42.86	43.75	58.33	50.00	64.18	46.15	58.33	62.50	48.00
Another Computer System, same model	33.33	0.00	0.00	12.50	11.11	0.00	8.96	7.69	8.33	12.50	16.00
Integrated Word Processing capabilities	11.11	0.00	14.29	12.50	8.33	0.00	20.90	7.69	16.67	0.00	12.00
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	22.22	25.00	0.00	12.50	5.56	14.29	11.94	7.69	8.33	0.00	4.00
Yes, vendor unknown	0.00	0.00	0.00	0.00	2.78	7.14	0.00	0.00	0.00	0.00	4.00
Yes, different vendor	22.22	25.00	0.00	6.25	0.00	7.14	0.00	0.00	0.00	0.00	4.00
No	55.56	50.00	100.00	81.25	91.67	71.43	88.06	92.31	91.67	100.00	80.00

Manufacturer and Model \ Survey Item	Harris 100/200	Harris (other models)	Hewlett-Packard 250	Hewlett-Packard 1000	Hewlett-Packard 3000	Hewlett-Packard 3000 II	Hewlett-Packard 3000 III	Hewlett-Packard 3000 30	Hewlett-Packard 3000 33	Hewlett-Packard (other models)	Honeywell Level 6
Significant Advantages (%)											
Users are happy with response time	22.22	25.00	85.71	56.25	63.89	50.00	67.16	46.15	50.00	75.00	52.00
System is easy to expand/reconfigure	33.33	75.00	85.71	50.00	77.78	71.43	89.55	100	100	62.50	72.00
System costs were less than expected	11.11	25.00	0.00	12.50	16.67	0.00	25.37	7.69	16.67	12.50	16.00
Programs/data carried over from other systems are compatible, as vendor promised	11.11	0.00	14.29	6.25	33.33	35.71	35.82	38.46	33.33	12.50	28.00
Terminals/peripherals carried over from other systems are compatible, as vendor promised	0.00	0.00	0.00	0.00	13.89	7.14	17.91	7.69	0.00	12.50	20.00
System is power/energy efficient	0.00	0.00	85.71	6.25	16.67	28.57	35.82	61.54	25.00	25.00	8.00
Productivity aids help us keep programming costs down	22.22	0.00	100.00	6.25	44.44	7.14	56.72	61.54	58.33	50.00	16.00
Data base language is efficient and effective	11.11	0.00	100.00	31.25	55.56	64.29	80.60	76.92	58.33	37.50	16.00
Delivery and/or installation of equipment was ahead of schedule	11.11	0.00	28.57	0.00	13.89	14.29	35.82	15.38	8.33	12.50	12.00
Delivery of required software was ahead of schedule	0.00	0.00	57.14	0.00	5.56	7.14	16.42	7.69	8.33	0.00	8.00
Significant Problems (%)											
Computer proposed by vendor was too small	33.33	0.00	14.29	18.75	8.33	14.29	2.99	0.00	8.33	12.50	20.00
Installation of equipment was late	22.22	75.00	28.57	18.75	2.78	7.14	2.99	15.38	8.33	25.00	20.00
Delivery of required software was late	11.11	0.00	0.00	12.50	5.56	7.14	2.99	7.69	16.67	0.00	32.00
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	22.22	0.00	0.00	18.75	11.11	0.00	5.97	0.00	0.00	0.00	16.00
Vendor did not provide all the promised software or support	11.11	25.00	0.00	18.75	8.33	0.00	4.48	0.00	0.00	0.00	24.00
Program/data compatibility not what vendor promised	11.11	0.00	0.00	6.25	2.78	0.00	2.99	0.00	8.33	0.00	0.00
Terminals/peripherals compatibility not what vendor promised	0.00	0.00	0.00	6.25	0.00	7.14	1.49	7.69	0.00	12.50	4.00
Vendor enhancements/changes to hardware/software hard to keep up with	22.22	0.00	0.00	37.50	8.33	0.00	4.48	0.00	0.00	0.00	12.00
Equipment is excessively noisy	11.11	0.00	0.00	12.50	2.78	0.00	0.00	0.00	0.00	0.00	4.00
Power and/or cooling requirements are excessive	11.11	0.00	0.00	6.25	2.78	0.00	0.00	0.00	0.00	0.00	4.00
System Ratings (4.0-0.0):											
Ease of operation	3.11	3.00	3.86	3.13	3.51	3.57	3.82	3.62	3.92	3.80	3.12
Reliability of Mainframe	3.00	3.25	4.00	3.56	3.80	3.93	3.87	3.77	3.91	3.80	3.32
Reliability of Peripherals	2.44	2.25	3.29	3.50	3.49	3.29	3.60	3.46	3.58	3.25	2.96
Maintenance service:											
Responsiveness	2.67	2.50	3.67	3.19	3.31	3.36	3.40	3.54	3.50	3.20	2.84
Effectiveness	2.44	3.00	3.67	3.27	3.35	3.21	3.42	3.54	3.33	3.50	2.84
Technical support:											
Trouble-shooting	2.11	2.25	3.40	2.79	2.83	2.86	3.06	3.33	2.75	3.00	2.64
Education	1.78	2.75	3.60	2.73	2.81	3.23	3.18	3.25	3.08	2.60	2.35
Documentation	2.00	2.67	3.67	2.50	2.86	3.08	3.13	3.17	3.33	3.00	2.30
Manufacturer's software:											
Operating system	2.89	3.75	3.86	3.06	3.53	3.43	3.79	3.62	3.50	3.40	2.88
Compilers & Assemblers	2.67	3.00	4.00	3.13	3.29	3.31	3.55	3.31	2.92	3.00	3.04
Applications Programs	2.67	3.00	3.40	2.71	2.92	2.75	3.24	3.20	2.71	2.60	2.61
Ease of Programming	3.00	3.00	3.86	2.69	3.40	3.17	3.65	3.46	3.17	3.60	3.00
Ease of conversion	2.56	4.00	3.57	2.77	3.20	2.91	3.34	3.18	3.00	2.75	2.79
Overall satisfaction	2.78	2.75	3.86	3.06	3.40	3.36	3.75	3.62	3.50	3.60	2.88
Did the system do what you expected it to do? (%)											
Yes	77.78	100.00	85.71	81.25	77.78	92.86	97.01	84.62	100	87.50	64.00
No	22.22	0.00	0.00	6.25	0.00	0.00	0.00	0.00	0.00	0.00	8.00
Haven't decided	0.00	0.00	14.29	12.50	16.67	7.14	2.09	15.38	0.00	12.50	24.00
Would you recommend system to another user? (%)											
Yes	66.67	75.00	100.00	81.25	80.56	92.86	100.00	92.30	100.00	75.00	68.00
No	22.22	0.00	0.00	6.25	0.00	0.00	0.00	0.00	0.00	25.00	20.00
Haven't decided	11.11	25.00	0.00	12.50	16.67	7.14	0.00	7.23	0.00	0.00	12.00

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From Basic Four to Wang . . .

Survey Item	Honeywell 100/200	IBM Series/1	IBM System/3	IBM System/32	IBM System/34	IBM System/38	IBM 1130	IBM 8100	IBM (other models)	Minicomputer Systems MICOS	Microdata Reality
No. of User Responses	4	27	250	27	456	26	7	17	11	5	47
No. of Systems Represented	4	59	263	27	495	26	8	29	11	5	56
Avg. Life of System (Mos.)	131.0	16.6	50.7	39.3	18.5	4.2	135.8	7.6	39.0	21.8	24.4
Acquisition Method (%)											
Purchase	75.00	87.80	59.04	73.08	38.77	50.00	57.14	5.88	36.36	100	74.47
Rental or Lease from Mfr	0.00	2.44	29.72	23.08	56.83	46.15	42.86	94.12	54.55	0	0
Lease from 3rd Party	25.00	9.76	11.24	3.85	4.41	3.85	0.00	0.00	9.09	0	25.53
Principal Applications (%)											
Accounting/Billing	50.00	48.78	87.60	77.78	88.00	88.46	28.57	41.18	72.73	100	93.62
Banking-check processing/loans/savings	0.00	7.32	2.75	0.00	3.73	0.00	0.00	0.00	0.00	0	2.13
Construction/Architecture	0.00	7.32	2.00	4.81	4.67	11.54	0.00	11.76	9.09	0	2.13
Education-scheduling/administration	0.00	2.44	4.80	0.00	4.17	3.85	42.86	11.76	9.09	0	2.13
Engineering/Scientific	0.00	2.44	3.20	0.00	3.07	0.00	0.00	17.65	18.18	0	2.13
Health care/Medical	50.00	12.20	7.60	11.11	3.73	7.69	0.00	5.88	9.09	0	6.38
Insurance	25.00	4.88	4.80	11.11	4.61	3.85	0.00	11.76	0.00	20.00	4.26
Manufacturing	0.00	19.51	38.80	3.70	32.89	23.08	14.29	58.82	54.55	0	6.38
Mathematics/Statistics	25.00	12.20	6.40	0.00	3.73	7.69	28.57	5.88	9.90	0	6.38
Order Processing/Inventory Control	25.00	43.90	60.40	33.33	60.75	61.54	14.29	52.94	81.82	60.00	57.45
Payroll/Personnel	50.00	36.59	74.80	62.96	65.13	61.54	57.14	47.06	72.73	40.00	61.70
Petroleum/Fuel analysis	50.00	2.44	2.00	0.00	1.75	7.69	0.00	0.00	0.00	0	0
Process control	0.00	4.88	4.00	0.00	3.51	0.00	0.00	5.88	9.09	0	4.26
Purchasing	0.00	12.20	34.80	11.11	30.70	23.08	0.00	23.53	45.45	0	46.81
Sales Distribution	25.00	29.27	51.60	37.04	42.11	34.62	28.57	29.41	27.27	20.00	44.68
Other	25.00	24.39	18.80	25.93	19.52	15.38	14.29	17.65	18.18	20.00	36.17
Source of Applications Programs (%)											
In-house personnel	100.00	82.93	94.80	55.56	83.11	96.15	100.00	94.12	90.91	60.00	70.21
"Ready-made" programs from manufacturer	50.00	19.51	27.60	33.33	38.16	23.08	28.57	23.53	27.27	20.00	6.38
Contract Programming	50.00	26.83	28.00	59.26	37.06	19.23	28.57	23.53	36.36	0	51.06
Manufacturer's Personnel	0.00	0.00	4.80	0.00	3.29	0.00	0.00	5.88	0.00	0	2.13
Proprietary Software Packages	25.00	19.51	20.80	11.11	19.96	3.85	42.86	17.65	36.36	40.00	42.55
Location of Computer (%)											
Distributed Processing Site	0.00	7.32	4.03	14.81	6.80	7.69	0.00	82.35	20.00	0	6.38
Central Processing Installation	100.00	92.68	95.97	85.19	92.82	92.31	100.00	17.65	80.00	100	93.62
Using Local Workstations/Terminals (%)	86.21	100.00	68.00	62.96	93.13	100.00	14.29	100.00	100.00	100.00	100.00
Using Remote Workstations/Terminals (%)	100.00	41.46	27.60	11.11	97.14	46.15	0.00	41.17	45.45	40.00	100.00
Using Data Base Management System (%)	0.00	34.15	9.60	7.41	10.96	88.46	0.00	58.82	54.55	60.00	89.36
None	100.00	65.85	90.00	81.48	87.28	11.54	100.00	41.18	45.45	40.00	10.64
Manufacturer's Package	0.00	7.14	34.78	50.00	60.41	100.00	0.00	100.00	66.67	33.33	87.50
Outside Vendor's Package	0.00	35.71	8.70	0.00	6.25	0.00	0.00	0.00	16.67	66.67	7.50
Home-Grown System	0.00	57.14	56.52	50.00	33.33	0.00	0.00	0.00	16.67	0.00	5.00
Using Communications Monitor (%)	0.00	46.34	29.20	0.00	20.61	38.46	0.00	47.06	36.36	20.00	31.91
None	100.00	53.66	69.20	88.89	76.10	57.69	100.00	52.94	54.55	80.00	68.09
Manufacturer's Package	0.00	72.22	93.15	0.00	76.14	100.00	0.00	87.50	75.00	100.00	81.82
Outside Vendor's Package	0.00	11.11	0.00	0.00	15.19	0.00	0.00	0.00	25.00	0.00	0.00
Home-Grown System	0.00	16.67	6.85	0.00	7.95	0.00	0.00	12.50	0.00	0.00	18.18
Using Integrated Word Processing Functions (%)	0.00	17.07	4.00	4.00	18.96	3.85	0.00	0.00	0.00	0.00	55.32
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	0.00	36.59	12.40	0.00	21.27	42.31	0.00	47.06	18.18	20.00	6.38
Proprietary Software from other suppliers	25.00	21.95	16.40	11.11	25.88	15.38	28.57	23.57	18.18	0.00	29.79
Expansions to Data Communications facilities	0.00	43.90	29.60	7.41	32.46	53.85	14.29	17.65	18.18	20.00	29.79
Distributed Processing capabilities	0.00	9.76	13.20	7.41	13.16	34.62	0.00	41.18	9.09	0.00	14.89
Expansions to present hardware	0.00	95.12	23.20	18.51	49.12	46.15	14.29	64.71	0.00	40.00	34.04
Another Computer System, same model	0.00	21.95	5.60	3.70	4.17	11.54	0.00	17.65	0.00	20.00	8.51
Integrated Word Processing capabilities	0.00	24.39	5.20	7.41	16.45	19.23	0.00	29.41	0.00	20.00	10.64
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	0.00	2.44	31.20	22.22	7.46	0.00	0.00	0.00	36.36	0.00	2.13
Yes, vendor unknown	0.00	2.44	5.60	7.41	1.32	0.00	14.29	5.88	0.00	0.00	8.51
Yes, different vendor	25.00	2.44	4.80	11.11	0.44	0.00	42.86	0.00	18.18	20.00	8.51
No	75.00	92.68	58.00	59.26	89.99	96.15	42.86	94.12	45.45	80.00	80.85

Survey Item	Honeywell 100/200	IBM Series/1	IBM System/3	IBM System/32	IBM System/34	IBM System/38	IBM 1130	IBM 8100	IBM (other models)	Minicomputer Systems MICOS	Microdata Reality
Significant Advantages (%)											
Users are happy with response time	25.00	43.90	44.00	11.11	66.89	53.85	28.57	23.53	36.36	60.00	55.32
System is easy to expand/reconfigure	0.00	60.98	31.60	18.52	83.77	88.46	0.00	52.94	36.36	80.00	68.09
System costs were less than expected	25.00	19.51	16.00	14.81	14.47	19.23	14.29	11.76	9.09	0.00	12.77
Programs/data carried over from other systems are compatible, as vendor promised	0.00	7.32	31.60	18.52	45.18	57.69	14.29	23.53	36.36	0.00	19.15
Terminals/peripherals carried over from other systems are compatible, as vendor promised	0.00	12.20	12.00	3.70	7.86	23.08	0.00	17.65	27.27	20.00	19.15
System is power/energy efficient	0.00	29.27	9.20	7.41	23.90	57.69	0.00	17.85	18.18	60.00	23.40
Productivity aids help us keep programming costs down	0.00	19.51	23.60	25.93	57.68	80.77	14.29	41.18	27.27	40.00	44.68
Data base language is efficient and effective	0.00	12.20	5.20	3.70	4.60	69.23	0.00	17.65	27.27	60.00	89.36
Delivery and/or installation of equipment was ahead of schedule	25.00	2.44	7.20	14.81	19.08	26.92	0.00	5.88	9.09	40.00	10.64
Delivery of required software was ahead of schedule	25.00	2.44	4.00	3.70	10.09	7.69	0.00	11.76	0.00	40.00	6.38
Significant Problems (%)											
Computer proposed by vendor was too small	0.00	21.95	8.00	18.52	7.68	3.85	0.00	23.53	9.09	40.00	12.77
Installation of equipment was late	0.00	24.39	2.80	0.00	3.07	11.54	0.00	23.53	9.09	0.00	10.64
Delivery of required software was late	0.00	26.83	1.60	11.11	3.95	11.54	0.00	17.65	0.00	0.00	21.28
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	0.00	14.63	4.40	3.70	8.11	7.69	0.00	11.76	9.09	40.00	8.51
Vendor did not provide all the promised software or support	0.00	19.51	5.20	3.70	7.46	23.08	0.00	23.53	9.09	0.00	14.89
Program/data compatibility not what vendor promised	0.00	12.20	1.60	0.00	1.75	11.54	0.00	17.65	9.09	0.00	2.13
Terminals/peripherals compatibility not what vendor promised	0.00	7.32	2.40	0.00	0.22	0.00	0.00	0.00	0.00	0.00	2.13
Vendor enhancements/changes to hardware/software hard to keep up with	0.00	26.83	4.00	3.70	9.21	7.69	0.00	11.76	18.18	0.00	2.13
Equipment is excessively noisy	50.00	2.44	13.60	3.70	2.85	0.00	14.29	5.88	9.09	0.00	4.26
Power and/or cooling requirements are excessive	0.00	0.00	8.40	0.00	1.10	0.00	14.29	5.88	9.09	20.00	8.51
System Ratings (4.0-0.0)											
Ease of operation	2.75	3.02	3.24	3.30	3.65	3.56	3.33	2.82	3.20	3.80	3.81
Reliability of Mainframe	3.25	3.61	3.66	3.44	3.76	3.75	3.71	2.88	3.36	3.80	3.37
Reliability of Peripherals	3.25	3.51	3.26	3.37	3.64	3.52	3.33	3.00	3.18	3.40	3.07
Maintenance service											
Responsiveness	2.75	3.29	3.24	3.48	3.46	3.54	3.57	3.13	3.18	3.40	3.30
Effectiveness	2.75	3.22	3.20	3.44	3.41	3.52	2.86	2.81	3.09	3.20	3.06
Technical support											
Trouble-shooting	2.50	2.51	2.86	3.19	2.98	2.96	2.67	2.50	3.11	3.20	2.85
Education	2.50	2.38	2.84	2.92	3.01	2.73	2.50	2.56	2.67	3.00	2.49
Documentation	2.50	2.50	2.79	3.08	3.08	2.77	2.83	2.50	2.89	2.60	2.57
Manufacturer's software											
Operating system	2.50	2.74	3.22	3.29	3.49	3.36	3.00	2.94	3.27	3.50	3.82
Compilers & Assemblers	2.50	2.76	3.28	3.17	3.48	3.52	3.14	2.73	2.82	—	3.59
Applications Programs	2.33	2.66	2.79	3.05	2.89	3.33	3.33	2.38	2.29	3.00	3.10
Ease of Programming	2.75	2.69	3.17	3.17	3.44	3.65	3.00	2.75	2.67	3.50	3.70
Ease of conversion	1.67	2.38	2.92	3.16	3.23	2.46	1.50	2.60	2.44	3.00	3.44
Overall satisfaction	2.75	2.95	3.19	3.16	3.51	3.38	3.14	2.81	2.73	3.40	3.49
Did the system do what you expected it to do? (%)											
Yes	100.00	73.17	92.00	74.07	94.08	80.77	100.00	58.82	72.73	100.00	95.74
No	0.00	12.20	3.20	11.11	1.32	7.69	0.00	17.65	9.09	0.00	2.13
Haven't decided	0.00	14.63	4.00	14.81	4.62	11.54	0.00	23.53	18.18	0.00	2.13
Would you recommend system to another user? (%)											
Yes	75.00	75.61	74.80	76.00	97.16	92.31	42.86	70.59	63.64	80.00	91.49
No	25.00	9.76	16.40	20.00	1.18	3.85	57.14	11.76	27.27	0.00	8.51
Haven't decided	0.00	12.20	7.20	4.00	1.42	3.85	0.00	17.65	9.09	20.00	0.00

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Survey Item / Manufacturer and Model	Microdata (other models)	Modcomp Classic	NCR Century	NCR 300	NCR 8200	NCR 8300	Nixdorf (all models)	Northern Telecom (all models)	Perkin Elmer 732/832	Perkin Elmer 3200	Point 4 (all models)
No. of User Responses	5	4	24	7	45	6	7	12	8	11	9
No. of Systems Represented	8	4	24	9	48	6	13	18	18	19	12
Avg. Life of System (Mos.)	34.5	10.0	74.3	74.8	27.7	22.00	64.4	34.8	36.5	10.4	17.6
Acquisition Method (%)											
Purchase	60.00	75.00	79.17	85.71	52.27	50.00	71.43	16.67	75.00	90.91	87.50
Rental or Lease from Mfr.	0.00	0.00	12.50	14.29	29.55	50.00	28.57	83.33	0.00	0.00	0.00
Lease from 3rd Party	40.00	25.00	8.33	0.00	18.18	0.00	0.00	0.00	25.00	9.09	12.50
Principal Applications (%)											
Accounting/Billing	80.00	75.00	87.50	57.14	80.00	66.67	85.71	75.00	75.00	27.27	88.89
Banking-check processing, loans, savings	20.00	0.00	8.33	42.86	13.33	16.67	0.00	8.33	12.50	18.18	0.00
Construction/Architecture	0.00	0.00	0.00	0.00	4.44	0.00	14.29	0.00	0.00	9.09	0.00
Education-scheduling/administration	20.00	0.00	25.00	0.00	2.22	0.00	0.00	8.33	12.50	9.09	11.11
Engineering/Scientific	0.00	0.00	8.33	0.00	0.00	0.00	0.00	8.33	12.50	18.18	0.00
Health care/Medical	0.00	50.00	4.17	14.29	2.22	0.00	0.00	0.00	25.00	0.00	11.11
Insurance	20.00	25.00	0.00	0.00	0.00	0.00	14.29	8.33	12.50	0.00	11.11
Manufacturing	20.00	0.00	8.33	0.00	6.67	33.33	0.00	41.67	0.00	18.18	11.11
Mathematics/Statistics	0.00	0.00	12.50	0.00	0.00	0.00	0.00	8.33	0.00	9.09	11.11
Order Processing/Inventory Control	60.00	25.00	37.50	0.00	51.11	50.00	57.14	75.00	37.50	36.36	44.44
Payroll/Personnel	0.00	50.00	79.17	28.57	66.67	100.00	57.14	83.33	25.00	9.09	55.56
Petroleum/Fuel analysis	0.00	0.00	0.00	0.00	4.44	0.00	14.29	0.00	0.00	0.00	0.00
Process control	0.00	25.00	4.17	0.00	4.44	0.00	0.00	8.33	12.50	18.18	0.00
Purchasing	20.00	25.00	20.83	14.29	26.67	0.00	28.57	33.33	25.00	18.18	11.11
Sales Distribution	40.00	25.00	29.17	0.00	33.33	16.67	57.14	25.00	25.00	18.18	33.33
Other	20.00	0.00	25.00	14.29	11.11	0.00	42.86	8.33	25.00	27.27	55.56
Source of Applications Programs (%)											
In-house personnel	40.00	50.00	79.17	42.86	62.22	50.00	57.14	83.33	62.50	81.82	88.89
"Ready-made" programs from manufacturer	0.00	0.00	45.83	42.86	53.33	83.33	28.57	16.67	25.00	18.18	0.00
Contract Programming	40.00	0.00	25.00	14.29	26.67	16.67	14.29	41.67	50.00	9.09	22.22
Manufacturer's Personnel	0.00	0.00	12.50	57.14	13.33	0.00	14.29	0.00	12.50	9.09	0.00
Proprietary Software Packages	40.00	50.00	8.33	0.00	24.44	0.00	0.00	25.00	50.00	45.45	44.44
Location of Computer (%)											
Distributed Processing Site	20.00	25.00	0.00	14.29	15.56	0.00	33.33	66.67	37.50	18.18	12.50
Central Processing Installation	80.00	75.00	100.00	85.71	84.44	100.00	66.67	33.33	62.50	81.82	87.50
Using Local Workstations/Terminals (%)	100.00	100.00	100.00	100.00	100.00	100.00	85.73	100.00	100.00	100.00	100.00
Using Remote Workstations/Terminals (%)	100.00	100.00	95.83	100.00	95.56	100.00	71.43	41.67	50.00	81.81	77.77
Using Data Base Management System (%)	60.00	50.00	4.17	0.00	15.56	33.33	42.86	16.67	12.50	54.55	44.44
None	40.00	50.00	95.83	100.00	84.44	66.67	57.14	83.33	87.50	45.45	55.56
Manufacturer's Package	100.00	0.00	100.00	0.00	50.00	100.00	66.67	0.00	0.00	66.67	50.00
Outside Vendor's Package	0.00	100.00	0.00	0.00	16.67	0.00	0.00	50.00	0.00	33.33	0.00
Home-Grown System	0.00	0.00	0.00	0.00	33.33	0.00	33.33	50.00	100.00	0.00	50.00
Using Communications Monitor (%)	20.00	50.00	16.67	14.29	8.89	16.67	71.43	58.33	25.00	63.64	11.11
None	80.00	50.00	83.33	85.71	91.11	83.33	28.57	41.67	75.00	36.36	88.89
Manufacturer's Package	0.00	0.00	75.00	100.00	50.00	0.00	80.00	71.43	0.00	57.14	0.00
Outside Vendor's Package	100.00	50.00	25.00	0.00	50.00	0.00	0.00	14.29	50.00	42.86	0.00
Home-Grown System	0.00	50.00	0.00	0.00	0.00	0.00	20.00	14.29	50.00	0.00	100.00
Using Integrated Word Processing Functions (%)	20.00	0.00	4.17	14.29	4.44	0.00	14.29	0.00	25.00	0.00	55.56
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	0.00	0.00	12.50	42.86	20.00	33.33	28.57	16.67	37.50	18.18	33.33
Proprietary Software from other suppliers	20.00	25.00	16.67	14.29	22.22	16.67	0.00	16.67	25.00	36.36	11.11
Expansions to Data Communications facilities	0.00	25.00	16.67	28.57	17.78	66.67	28.57	41.67	37.50	54.55	11.11
Distributed Processing capabilities	0.00	0.00	4.17	14.29	2.22	0.00	14.29	33.33	12.50	9.09	11.11
Expansions to present hardware	20.00	75.00	25.00	28.57	35.56	16.67	14.29	33.33	37.50	54.55	55.56
Another Computer System, same model	20.00	0.00	25.00	14.29	6.67	0.00	0.00	8.33	0.00	27.27	0.00
Integrated Word Processing capabilities	0.00	0.00	0.00	14.29	4.44	0.00	14.29	8.33	0.00	27.27	22.22
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	0.00	0.00	8.33	14.29	20.00	16.67	0.00	0.00	0.00	9.09	0.00
Yes, vendor unknown	0.00	0.00	29.17	42.86	6.67	0.00	0.00	16.67	0.00	9.09	0.00
Yes, different vendor	20.00	0.00	16.67	28.57	13.33	16.67	0.00	25.00	12.50	0.00	0.00
No	80.00	100.00	45.83	14.29	60.00	50.00	100.00	58.33	87.50	81.82	100.00

Manufacturer and Model / Survey Item	Microdata (other models)	Modcomp Classic	NCR Century	NCR 300	NCR 8200	NCR 8300	Nixdorf (all models)	Northern Telecom (all models)	Perkin Elmer 732/832	Perkin Elmer 3200	Point 4 (all models)
Significant Advantages (%)											
Users are happy with response time	0.00	75.00	37.50	28.57	37.78	33.33	57.14	41.67	62.50	63.64	77.78
System is easy to expand/reconfigure	40.00	75.00	50.00	28.57	55.56	50.00	57.14	25.00	62.50	90.91	100.00
System costs were less than expected	0.00	25.00	33.33	28.57	15.56	0.00	0.00	8.33	25.00	27.27	55.56
Programs/data carried over from other systems are compatible, as vendor promised	0.00	50.00	45.83	14.29	22.22	83.33	14.29	16.67	12.50	27.27	44.44
Terminals/peripherals carried over from other systems are compatible, as vendor promised	0.00	50.00	12.50	14.29	15.56	16.67	0.00	8.33	25.00	36.36	66.67
System is power/energy efficient	0.00	25.00	8.33	28.57	13.33	0.00	14.29	8.33	37.50	18.18	55.56
Productivity aids help us keep programming costs down	40.00	0.00	8.33	0.00	17.78	16.67	28.57	8.33	12.50	45.45	44.44
Data base language is efficient and effective	40.00	25.00	4.17	0.00	8.89	0.00	57.14	0.00	0.00	27.27	11.11
Delivery and/or installation of equipment was ahead of schedule	0.00	25.00	12.50	0.00	11.11	0.00	14.29	8.33	0.00	36.36	33.33
Delivery of required software was ahead of schedule	0.00	0.00	8.33	0.00	6.67	0.00	28.57	0.00	0.00	27.27	22.22
Significant Problems (%)											
Computer proposed by vendor was too small	20.00	0.00	4.17	14.29	24.44	16.67	0.00	33.33	12.50	18.18	0.00
Installation of equipment was late	40.00	25.00	8.33	0.00	20.00	0.00	0.00	16.67	50.00	0.00	11.11
Delivery of required software was late	40.00	0.00	8.33	14.29	28.89	0.00	0.00	16.67	62.50	0.00	22.22
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	0.00	25.00	16.67	14.29	17.78	0.00	0.00	0.00	12.50	9.09	11.11
Vendor did not provide all the promised software or support	20.00	0.00	20.83	57.14	33.33	0.00	0.00	33.33	25.00	9.09	0.00
Program/data compatibility not what vendor promised	0.00	0.00	0.00	0.00	15.56	0.00	0.00	0.00	0.00	9.09	0.00
Terminals/peripherals compatibility not what vendor promised	0.00	0.00	4.17	0.00	4.44	0.00	0.00	0.00	12.50	0.00	0.00
Vendor enhancements/changes to hardware/software hard to keep up with	20.00	0.00	20.83	14.29	17.78	33.33	14.29	25.00	37.50	18.18	11.11
Equipment is excessively noisy	0.00	0.00	29.17	42.86	17.78	0.00	0.00	33.33	12.50	9.09	0.00
Power and/or cooling requirements are excessive	0.00	0.00	12.50	14.29	2.22	0.00	0.00	0.00	0.00	0.00	0.00
System Ratings (4.0-0.0)											
Ease of operation	3.60	3.00	3.17	2.86	3.22	3.17	3.71	3.17	3.00	3.45	3.78
Reliability of Mainframe	2.60	3.50	3.54	3.14	3.29	2.67	3.14	2.83	3.38	3.82	3.88
Reliability of Peripherals	3.40	3.50	2.92	3.17	3.13	2.67	2.86	2.42	2.63	3.36	3.56
Maintenance service											
Responsiveness	3.20	3.25	3.00	3.43	2.91	3.17	3.43	3.00	3.13	3.45	3.11
Effectiveness	3.00	3.25	2.88	3.29	2.82	3.33	3.17	2.18	2.75	3.20	3.22
Technical support											
Trouble-shooting	2.20	3.25	2.41	3.20	2.41	2.33	3.43	2.75	2.50	2.73	3.44
Education	2.00	2.50	2.41	2.50	2.41	2.67	3.17	2.00	2.00	2.78	3.00
Documentation	2.00	2.25	2.17	2.00	2.32	2.33	3.00	2.08	2.00	2.82	2.89
Manufacturer's software											
Operating system	3.25	3.25	2.96	2.83	2.82	2.67	3.17	2.70	2.50	2.91	3.67
Compilers & Assemblers	3.25	3.50	2.92	2.17	3.07	2.83	3.17	2.50	2.75	3.55	3.67
Applications Programs	4.00	3.33	2.52	2.40	2.32	2.67	3.25	2.33	2.83	2.67	3.38
Ease of Programming	4.00	3.00	2.92	2.14	3.07	2.67	3.67	2.80	2.63	3.40	3.78
Ease of conversion	3.00	2.75	2.86	2.33	2.70	3.00	3.40	2.71	2.50	3.40	3.43
Overall satisfaction	2.80	3.50	2.88	2.71	2.76	2.50	3.33	2.58	2.88	3.36	3.78
Did the system do what you expected it to do? (%)											
Yes	80.00	100.00	91.67	85.71	75.56	66.67	85.71	83.33	87.50	90.91	100.00
No	20.00	0.00	8.33	14.29	15.56	16.67	0.00	8.33	12.50	0.00	0.00
Haven't decided	0.00	0.00	0.00	0.00	8.89	16.67	14.29	8.33	0.00	9.09	0.00
Would you recommend system to another user? (%)											
Yes	60.00	75.00	50.00	57.14	66.67	50.00	100.00	58.33	87.50	90.91	100.00
No	20.00	0.00	37.50	42.86	22.22	16.67	0.00	16.67	12.50	0.00	0.00
Haven't decided	20.00	25.00	8.33	0.00	11.11	33.33	0.00	25.00	0.00	9.09	0.00

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Users Rate Their Minis . . .

Survey Item / Manufacturer and Model	Prime Info	Prime 300/350	Prime 400/450	Prime 500/550	Prime 650	Prime 750	Prime (other models)	Qantel 200/300	Qantel 1400	Qantel (other models)	Tandem T16
No. of User Responses	4	7	21	16	4	12	3	5	11	5	10
No. of Systems Represented	4	11	25	17	5	24	3	19	14	5	19
Avg. Life of System (Mos.)	8.5	26.3	30.5	15.9	12.0	8.9	6.0	8.2	20.1	16.3	14.9
Acquisition Method (%)											
Purchase	75.00	85.71	57.14	62.50	50.00	50.00	33.33	40.00	88.89	100.00	80.00
Rental or Lease from Mfr.	25.00	0.00	28.57	12.50	50.00	33.33	66.67	0.00	0.00	0.00	0.00
Lease from 3rd Party	0.00	14.29	14.29	25.00	0.00	16.67	0.00	60.00	11.11	0.00	20.00
Principal Applications (%)											
Accounting/Billing	50.00	42.86	61.90	62.50	75.00	16.67	66.67	100.00	100.00	80.00	30.00
Banking-check processing/loans/savings	0.00	0.00	4.76	12.50	0.00	0.00	0.00	0.00	11.11	0.00	20.00
Construction/Architecture	0.00	14.29	4.76	6.25	25.00	0.00	0.00	20.00	0.00	0.00	0.00
Education-scheduling/administration	25.00	0.00	4.76	25.00	0.00	16.67	0.00	0.00	0.00	0.00	20.00
Engineering/Scientific	0.00	28.57	28.57	43.75	0.00	33.33	0.00	0.00	0.00	0.00	20.00
Health care/Medical	0.00	0.00	4.76	6.25	0.00	0.00	0.00	20.00	11.11	0.00	20.00
Insurance	0.00	14.29	0.00	0.00	0.00	8.33	0.00	20.00	0.00	0.00	0.00
Manufacturing	25.00	14.29	4.76	25.00	0.00	8.33	33.33	40.00	66.67	0.00	0.00
Mathematics/Statistics	50.00	28.57	23.81	31.25	0.00	16.67	0.00	20.00	0.00	0.00	10.00
Order Processing/Inventory Control	25.00	28.57	23.81	50.00	0.00	33.33	66.67	100.00	66.67	80.00	20.00
Payroll/Personnel	50.00	28.57	38.10	50.00	25.00	25.00	66.67	100.00	77.78	20.00	20.00
Petroleum/Fuel analysis	0.00	0.00	9.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Process control	0.00	0.00	4.76	0.00	0.00	8.33	33.33	0.00	0.00	0.00	0.00
Purchasing	50.00	14.29	9.52	6.25	0.00	16.67	66.67	60.00	77.78	0.00	0.00
Sales Distribution	0.00	28.57	14.29	18.75	0.00	25.00	33.33	100.00	77.78	40.00	0.00
Other	25.00	42.86	52.38	18.75	25.00	25.00	66.67	0.00	22.22	40.00	30.00
Source of Applications Programs (%)											
In-house personnel	50.00	100.00	95.24	87.50	100.00	83.33	66.67	40.00	66.67	40.00	80.00
"Ready-made" programs from manufacturer	25.00	14.29	23.81	25.00	50.00	25.00	0.00	100.00	77.78	60.00	20.00
Contract Programming	0.00	42.86	9.52	56.25	50.00	41.67	33.33	80.00	88.89	40.00	20.00
Manufacturer's Personnel	0.00	0.00	4.76	0.00	25.00	8.33	0.00	40.00	0.00	0.00	0.00
Proprietary Software Packages	100.00	14.29	33.33	56.25	75.00	50.00	33.33	20.00	0.00	0.00	50.00
Location of Computer (%)											
Distributed Processing Site	0.00	0.00	0.00	18.75	50.00	8.33	0.00	0.00	0.00	0.00	30.00
Central Processing Installation	100.00	100.00	100.00	81.25	50.00	91.67	100.00	100.00	100.00	100.00	70.00
Using Local Workstations/Terminals (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	80.00	100.00
Using Remote Workstations/Terminals (%)	50.00	85.72	80.95	68.75	100.00	83.33	100.00	60.00	33.33	20.00	100.00
Using Data Base Management System (%)	75.00	14.29	47.62	37.50	50.00	50.00	33.33	80.00	55.56	40.00	80.00
None	25.00	85.71	52.38	62.50	50.00	50.00	66.67	20.00	44.44	40.00	20.00
Manufacturer's Package	100.00	0.00	44.44	83.33	50.00	66.67	0.00	100.00	60.00	100.00	87.50
Outside Vendor's Package	0.00	0.00	44.44	0.00	50.00	33.33	100.00	0.00	20.00	0.00	12.50
Home-Grown System	0.00	100.00	11.11	16.67	0.00	0.00	0.00	0.00	20.00	0.00	0.00
Using Communications Monitor (%)	25.00	28.57	23.81	18.75	25.00	41.67	66.67	20.00	33.33	0.00	50.00
None	75.00	71.43	76.19	81.25	75.00	58.33	33.33	80.00	55.56	100.00	50.00
Manufacturer's Package	100.00	0.00	80.00	66.67	100.00	100.00	0.00	100.00	66.67	0.00	60.00
Outside Vendor's Package	0.00	0.00	20.00	33.33	0.00	0.00	50.00	0.00	33.33	0.00	40.00
Home-Grown System	0.00	100.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00	0.00
Using Integrated Word Processing Functions (%)	75.00	57.14	28.57	37.50	75.00	50.00	100.00	80.00	77.78	40.00	40.00
Planned Acquisitions/Implementations for 1981 (%)											
Additional Software from the Manufacturer	0.00	0.00	23.81	50.00	25.00	25.00	33.33	20.00	55.56	20.00	40.00
Proprietary Software from other suppliers	50.00	0.00	23.81	37.50	25.00	50.00	0.00	20.00	33.33	0.00	20.00
Expansions to Data Communications facilities	25.00	28.57	28.57	43.75	50.00	58.33	66.67	40.00	22.22	0.00	20.00
Distributed Processing capabilities	0.00	0.00	4.76	6.25	50.00	8.33	0.00	0.00	11.11	20.00	0.00
Expansions to present hardware	75.00	71.43	61.90	81.25	50.00	25.00	66.67	60.00	66.67	20.00	90.00
Another Computer System, same model	0.00	0.00	23.81	25.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00
Integrated Word Processing capabilities	0.00	0.00	9.52	37.50	0.00	16.67	0.00	0.00	0.00	0.00	0.00
Plans for system replacement in 1981 (%)											
Yes, same manufacturer	0.00	28.57	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yes, vendor unknown	0.00	0.00	0.00	0.00	0.00	8.33	0.00	0.00	0.00	0.00	0.00
Yes, different vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.11	0.00	0.00
No	100.00	71.43	85.71	100.00	100.00	91.67	100.00	100.00	88.89	100.00	100.00

Manufacturer and Model / Survey Item	Prime Info	Prime 300/350	Prime 400/450	Prime 500/550	Prime 650	Prime 750	Prime (other models)	Qantel 200/300	Qantel 1400	Qantel (other models)	Tandem T16
Significant Advantages (%)											
Users are happy with response time	50.00	71.43	66.67	62.50	75.00	83.33	100.00	80.00	44.44	20.00	80.00
System is easy to expand/reconfigure	75.00	100.00	95.24	100.00	50.00	58.33	100.00	100.00	66.67	20.00	100.00
System costs were less than expected	25.00	42.86	19.05	31.25	0.00	0.00	0.00	40.00	22.22	0.00	0.00
Programs/data carried over from other systems are compatible, as vendor promised	25.00	28.57	42.86	18.75	0.00	25.00	0.00	80.00	44.44	0.00	20.00
Terminals/peripherals carried over from other systems are compatible, as vendor promised	50.00	14.29	47.62	31.25	0.00	16.67	0.00	40.00	22.22	0.00	10.00
System is power/energy efficient	25.00	0.00	23.81	12.50	0.00	8.33	33.33	60.00	22.22	0.00	30.00
Productivity aids help us keep programming costs down	75.00	42.86	42.86	18.75	50.00	25.00	66.67	60.00	44.44	20.00	50.00
Data base language is efficient and effective	75.00	0.00	19.05	18.75	25.00	25.00	33.33	80.00	44.44	40.00	80.00
Delivery and/or installation of equipment was ahead of schedule	25.00	28.57	33.33	25.00	0.00	16.67	33.33	60.00	33.33	0.00	20.00
Delivery of required software was ahead of schedule	25.00	14.29	14.29	6.25	0.00	8.33	33.33	40.00	22.22	20.00	0.00
Significant Problems (%)											
Computer proposed by vendor was too small	25.00	14.29	23.81	12.50	0.00	0.00	33.33	0.00	22.22	20.00	20.00
Installation of equipment was late	0.00	0.00	4.76	6.25	0.00	8.33	0.00	20.00	22.22	0.00	20.00
Delivery of required software was late	0.00	0.00	9.52	6.25	0.00	8.33	0.00	0.00	11.11	0.00	10.00
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	0.00	0.00	4.76	12.50	0.00	8.33	0.00	0.00	33.33	0.00	0.00
Vendor did not provide all the promised software or support	0.00	0.00	4.76	0.00	0.00	8.33	0.00	0.00	33.33	0.00	10.00
Program/data compatibility not what vendor promised	0.00	0.00	4.76	0.00	0.00	16.67	33.33	0.00	0.00	0.00	0.00
Terminals/peripherals compatibility not what vendor promised	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor enhancements/changes to hardware/software hard to keep up with	0.00	28.57	4.76	6.25	0.00	16.67	0.00	0.00	33.33	0.00	10.00
Equipment is excessively noisy	0.00	14.29	0.00	12.50	0.00	0.00	33.33	0.00	0.00	0.00	0.00
Power and/or cooling requirements are excessive	0.00	0.00	4.76	6.25	0.00	0.00	0.00	0.00	11.11	0.00	0.00
System Ratings (4.0-0.0)											
Ease of operation	3.50	3.57	3.67	3.63	3.50	3.42	4.00	4.00	3.56	3.60	3.70
Reliability of Mainframe	3.75	3.83	3.76	3.44	3.75	3.42	4.00	3.80	3.22	3.60	3.80
Reliability of Peripherals	2.75	3.67	3.43	3.27	3.75	3.17	3.00	3.80	2.89	3.20	2.80
Maintenance service:											
Responsiveness	4.00	3.33	3.24	2.81	2.75	3.00	3.33	4.00	3.11	3.25	3.30
Effectiveness	2.75	3.17	3.10	2.88	2.75	2.58	3.00	4.00	2.78	3.50	3.11
Technical support:											
Trouble-shooting	3.00	2.57	3.05	2.73	3.25	2.42	3.33	3.60	2.67	2.50	2.80
Education	2.50	2.25	2.95	2.56	2.50	2.67	3.00	3.00	2.67	2.50	3.20
Documentation	2.50	2.43	2.90	2.69	3.25	2.75	3.00	2.80	2.44	2.25	2.80
Manufacturer's software:											
Operating system	3.50	3.71	3.67	3.56	3.50	3.50	4.00	3.80	3.44	3.50	3.80
Compilers & Assemblers	3.75	3.43	3.50	3.13	3.50	3.17	3.67	3.80	3.56	3.50	3.50
Applications Programs	3.33	—	2.87	3.00	3.33	2.82	4.00	3.60	3.00	3.25	2.33
Ease of Programming	3.50	3.14	3.52	3.38	3.25	3.17	3.00	3.60	3.56	2.75	3.60
Ease of conversion	3.33	3.00	3.40	3.08	3.00	2.91	3.00	3.60	3.38	3.00	3.38
Overall satisfaction	3.75	3.29	3.52	3.50	3.50	3.25	3.67	3.80	2.89	3.25	3.70
Did the system do what you expected it to do? (%)											
Yes	100.00	100.00	100.00	75.00	50.00	83.33	66.67	100.00	66.67	100.00	100.00
No	0.00	0.00	0.00	6.25	0.00	8.33	0.00	0.00	11.11	0.00	0.00
Haven't decided	0.00	0.00	0.00	18.75	50.00	8.33	33.33	0.00	22.22	0.00	0.00
Would you recommend system to another user? (%)											
Yes	100.00	85.71	95.24	75.00	75.00	91.67	100.00	100.00	77.78	100.00	90.00
No	0.00	14.29	4.76	0.00	0.00	8.33	0.00	0.00	11.11	0.00	0.00
Haven't decided	0.00	0.00	0.00	25.00	25.00	0.00	0.00	0.00	11.11	0.00	10.00

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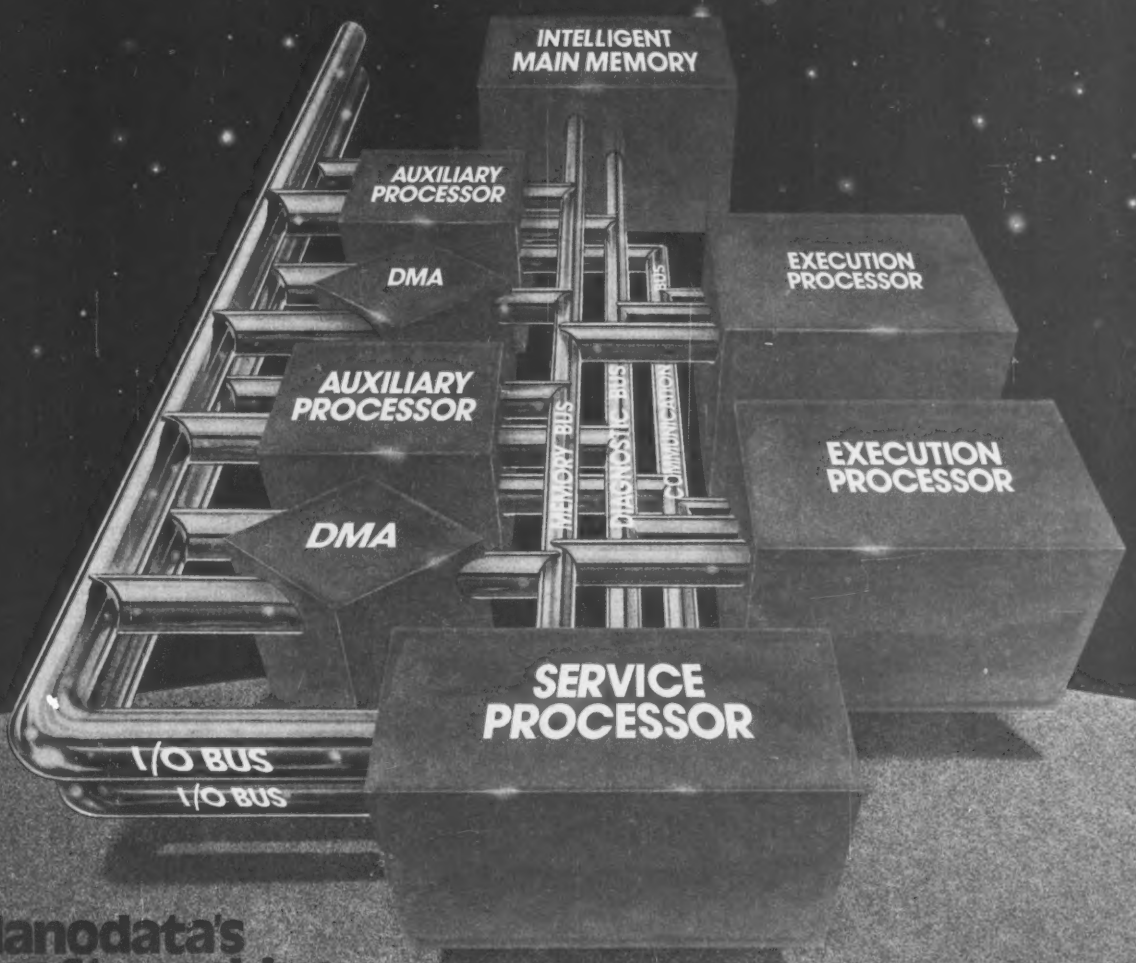
QMX MAINFRAME



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. . . And Their Manufacturers

Survey Item / Manufacturer and Model	Texas Instruments 990	Univac BC/7	Univac 9000 Series	Univac (other models)	Wang PCS & WCS	Wang VS	Wang 2200 Misc.	Wang 2200 MVP	Wang 2200 VP	Other Minicomputers
No. of User Responses	46	9	11	6	8	44	10	30	7	37
No. of Systems Represented	56	12	11	13	7	50	14	34	7	46
Avg. Life of System (Mos.)	16.2	33.3	99.6	113.0	32.0	13.8	41.2	16.4	35.2	40.1
Acquisition Method (%)										
Purchase	82.61	44.44	36.36	50.00	66.67	56.82	80.00	65.52	57.14	70.27
Rental or Lease from Mfr.	0.00	44.44	63.64	33.33	16.67	25.00	10.00	20.69	42.86	16.22
Lease from 3rd Party	17.39	11.11	0.00	16.67	16.67	18.18	10.00	13.79	0.00	13.51
Principal Applications (%)										
Accounting/Billing	80.43	77.78	81.82	16.67	50.00	75.00	90.00	76.67	42.86	67.57
Banking-check processing/loans/savings	2.17	100.00	100.00	0.00	0.00	0.00	10.00	0.00	14.29	2.70
Construction/Architecture	8.70	11.11	0.00	0.00	0.00	4.55	0.00	6.67	0.00	5.41
Education-scheduling/administration	4.35	0.00	0.00	16.67	0.00	9.09	10.00	0.00	14.29	13.51
Engineering/Scientific	6.52	0.00	0.00	16.67	16.67	6.82	10.00	10.00	14.29	13.51
Health care/Medical	6.52	0.00	0.00	0.00	0.00	9.09	20.00	3.33	14.29	0.00
Insurance	6.52	0.00	0.00	0.00	0.00	13.64	0.00	6.67	14.29	5.41
Manufacturing	17.39	11.11	18.18	0.00	16.67	20.45	20.00	6.67	0.00	21.62
Mathematics/Statistics	13.04	22.22	9.09	16.67	16.67	13.64	0.00	6.67	42.86	16.22
Order Processing/Inventory Control	47.83	44.44	54.55	33.33	16.67	59.09	60.00	43.33	42.86	62.16
Payroll/Personnel	52.17	44.44	72.73	16.67	16.67	54.55	50.00	46.67	57.14	43.24
Petroleum/Fuel analysis	2.17	0.00	9.09	0.00	0.00	2.27	0.00	6.67	0.00	0.00
Process control	2.17	11.11	9.09	0.00	0.00	2.27	0.00	6.67	14.29	8.11
Purchasing	26.09	11.11	36.36	0.00	16.67	22.73	30.00	30.00	28.57	21.62
Sales Distribution	32.61	22.22	54.55	16.67	33.33	38.64	20.00	36.67	42.86	29.73
Other	21.74	33.00	18.18	66.67	33.33	34.09	10.00	23.33	28.57	21.62
Source of Applications Programs (%)										
In-house personnel	86.96	77.78	100.00	83.33	50.00	100.00	60.00	56.67	71.43	64.86
"Ready-made" programs from manufacturer	13.04	33.33	27.27	33.33	33.33	27.27	10.00	13.33	0.00	35.14
Contract Programming	34.78	66.67	18.18	16.67	16.67	31.82	50.00	33.33	14.29	43.24
Manufacturer's Personnel	2.17	11.11	18.18	0.00	0.00	4.55	0.00	6.67	14.29	5.41
Proprietary Software Packages	23.91	0.00	9.09	16.67	16.67	47.73	20.00	46.67	28.57	21.62
Location of Computer (%)										
Distributed Processing Site	10.87	0.00	0.00	0.00	16.67	4.55	0.00	10.00	14.29	17.14
Central Processing Installation	89.13	100.00	100.00	100.00	83.33	95.45	100.00	90.00	85.71	82.86
Using Local Workstations/Terminals (%)	100.00	100.00	63.64	100.00	83.33	100.00	80.00	93.34	71.43	78.38
Using Remote Workstations/Terminals (%)	52.17	22.22	36.36	66.67	16.67	38.64	0.00	30.00	100.00	24.33
Using Data Base Management System (%)	23.91	22.22	18.18	50.00	0.00	11.36	20.00	36.67	42.86	18.92
None	76.09	77.78	81.82	50.00	100.00	84.09	80.00	63.33	57.14	75.68
Manufacturer's Package	45.46	50.00	50.00	33.33	0.00	80.00	50.00	18.18	0.00	57.14
Outside Vendor's Package	0.00	0.00	0.00	0.00	0.00	0.00	50.00	54.55	33.33	14.29
Home-Grown System	54.55	50.00	50.00	66.67	0.00	20.00	0.00	27.27	66.67	28.57
Using Communications Monitor (%)	34.78	0.00	36.36	66.67	16.67	36.36	10.00	13.33	0.00	29.73
None	65.22	100.00	63.64	33.33	83.33	59.09	90.00	86.67	100.00	67.57
Manufacturer's Package	80.00	0.00	100.00	50.00	100.00	93.75	0.00	75.00	0.00	80.00
Outside Vendor's Package	20.00	0.00	0.00	25.00	0.00	0.00	100.00	0.00	0.00	10.00
Home-Grown System	0.00	0.00	0.00	25.00	0.00	6.25	0.00	25.00	0.00	10.00
Using Integrated Word Processing Functions (%)	52.17	11.11	0.00	16.67	33.33	61.36	20.00	76.67	57.14	37.84
Planned Acquisitions/Implementations for 1981 (%)										
Additional Software from the Manufacturer	28.26	11.11	0.00	16.67	16.67	18.18	20.00	20.00	14.29	29.73
Proprietary Software from other suppliers	19.57	11.11	27.27	16.67	33.33	29.55	0.00	23.33	28.57	18.92
Expansions to Data Communications facilities	41.30	33.33	18.18	50.00	16.67	45.45	20.00	26.67	28.57	29.73
Distributed Processing capabilities	19.57	11.11	18.18	16.67	0.00	22.73	0.00	6.67	14.29	13.51
Expansions to present hardware	58.70	66.67	9.09	16.67	33.33	61.36	30.00	43.33	28.57	40.54
Another Computer System, same model	6.52	11.11	18.18	0.00	0.00	11.36	0.00	6.67	0.00	18.92
Integrated Word Processing capabilities	15.22	0.00	0.00	0.00	0.00	27.27	0.00	10.00	14.29	5.41
Plans for system replacement in 1981 (%)										
Yes, same manufacturer	6.52	22.22	27.27	0.00	0.00	6.82	10.00	10.00	0.00	8.11
Yes, vendor unknown	2.17	11.11	27.27	0.00	16.67	2.27	30.00	0.00	14.29	8.11
Yes, different vendor	0.00	11.11	18.18	0.00	16.67	6.82	10.00	3.33	14.29	8.11
No	91.30	55.56	27.27	100.00	66.67	84.09	50.00	83.33	71.43	75.68

Survey Item / Manufacturer and Model	Texas Instruments 990	Univac BC/7	Univac 9000 Series	Univac (other models)	Wang PCS & WCS	Wang VS	Wang 2200 Misc.	Wang 2200 MVP	Wang 2200 VP	Other Minicomputers
Significant Advantages (%)										
Users are happy with response time	82.61	33.33	9.09	50.00	50.00	72.73	30.00	66.67	57.14	35.14
System is easy to expand/reconfigure	82.61	66.67	9.09	50.00	66.67	90.91	50.00	70.00	71.43	48.65
System costs were less than expected	28.26	11.11	9.09	16.67	0.00	25.00	10.00	20.00	28.57	24.32
Programs/data carried over from other systems are compatible, as vendor promised	28.26	22.22	0.00	0.00	0.00	40.91	0.00	20.00	14.29	18.92
Terminals/peripherals carried over from other systems are compatible, as vendor promised	21.74	0.00	0.00	0.00	0.00	9.09	0.00	10.00	14.29	21.62
System is power/energy efficient	39.13	33.33	0.00	33.33	33.33	34.09	20.00	33.33	14.29	18.92
Productivity aids help us keep programming costs down	45.65	33.33	0.00	16.67	33.33	93.18	10.00	36.67	42.86	27.03
Data base language is efficient and effective	10.87	1.11	0.00	16.67	16.67	15.91	20.00	10.00	28.57	8.11
Delivery and/or installation of equipment was ahead of schedule	30.43	0.00	0.00	0.00	16.67	22.73	0.00	3.33	28.57	10.81
Delivery of required software was ahead of schedule	19.57	0.0	0.00	0.00	0.00	15.91	10.00	10.00	28.57	10.81
Significant Problems (%)										
Computer proposed by vendor was too small	2.17	22.22	0.00	0.00	16.67	11.36	10.00	16.67	14.29	10.81
Installation of equipment was late	8.70	44.44	0.00	33.33	33.33	25.00	0.00	23.33	14.29	10.81
Delivery of required software was late	8.70	22.22	0.00	16.67	33.33	11.36	0.00	6.67	14.29	10.81
System costs (for hardware, vendor-supplied software, support) exceeded the expected total	8.70	0.00	9.09	16.67	33.33	4.55	0.00	13.33	0.00	2.70
Vendor did not provide all the promised software or support	2.17	11.11	18.18	16.67	33.33	25.00	0.00	6.67	42.86	13.51
Program/data compatibility not what vendor promised	0.00	22.22	9.09	16.67	0.00	6.82	0.00	3.33	14.29	5.41
Terminals/peripherals compatibility not what vendor promised	2.17	0.00	9.09	0.00	0.00	2.27	0.00	3.33	0.00	5.41
Vendor enhancements/changes to hardware/software hard to keep up with	15.22	22.22	18.18	16.67	0.00	9.09	10.00	3.33	14.29	8.11
Equipment is excessively noisy	8.70	11.11	45.45	0.00	16.67	2.27	30.00	6.67	0.00	5.41
Power and/or cooling requirements are excessive	0.00	33.33	36.36	16.67	16.67	9.09	10.00	3.33	0.00	10.81
System Ratings (4.0-0.0)										
Ease of operation	3.55	3.22	2.50	3.17	3.50	3.75	3.50	3.60	3.71	3.41
Reliability of Mainframe	3.72	2.67	2.40	3.67	3.33	3.57	3.67	3.50	2.57	3.42
Reliability of Peripherals	3.53	2.33	2.10	3.17	3.50	2.95	3.20	3.14	3.00	3.08
Maintenance service:										
Responsiveness	3.27	3.44	2.91	2.83	2.17	2.70	2.40	2.90	2.43	3.09
Effectiveness	3.12	2.56	2.55	2.67	3.00	2.61	2.60	2.77	2.00	3.05
Technical support:										
Trouble-shooting	2.91	2.22	2.18	3.50	2.40	2.63	2.40	2.79	1.50	2.69
Education	2.64	2.22	2.27	2.33	2.20	2.43	2.40	2.55	1.83	2.48
Documentation	2.87	2.00	2.00	2.00	2.50	2.23	2.60	2.76	2.14	2.76
Manufacturer's software:										
Operating system	3.40	2.67	2.27	3.20	2.80	3.56	3.29	3.36	3.33	3.18
Compilers & Assemblers	3.34	2.89	2.64	3.17	2.67	3.57	3.50	3.37	3.60	2.86
Applications Programs	2.94	2.50	2.25	3.20	2.67	3.34	2.75	2.89	2.33	2.79
Ease of Programming	3.47	3.00	2.50	3.17	3.17	3.79	3.50	3.46	3.29	3.10
Ease of conversion	3.23	2.25	2.20	2.50	3.50	3.10	3.40	3.11	2.50	2.68
Overall satisfaction	3.52	2.44	2.45	2.83	3.17	3.41	3.10	3.23	2.86	3.00
Did the system do what you expected it to do? (%)										
Yes	93.48	66.67	54.55	66.67	83.33	88.64	70.00	86.67	85.71	83.78
No	4.35	0.00	27.27	33.33	16.67	9.09	10.00	3.33	0.00	5.41
Haven't decided	2.17	33.33	9.09	0.00	0.00	2.27	20.00	10.00	14.29	10.81
Would you recommend system to another user? (%)										
Yes	91.30	55.56	9.09	50.00	50.00	90.91	50.00	90.00	57.14	68.09
No	0.00	22.22	72.73	33.33	50.00	4.55	40.00	3.33	42.86	17.02
Haven't decided	8.70	22.22	9.09	16.67	0.00	4.55	10.00	6.67	0.00	12.77

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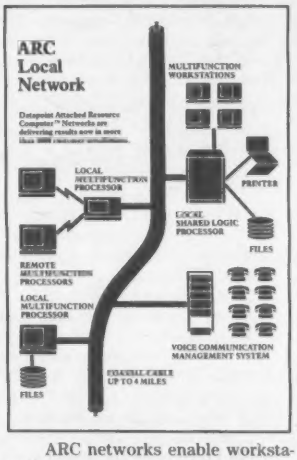

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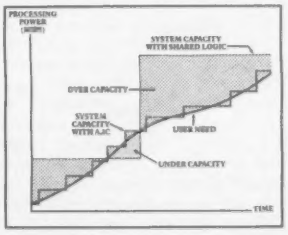

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DATAPOINT

EDITORIAL

NCC Grows Up

Just like the industry it serves, the National Computer Conference has grown up.

The latest edition of the show, held last week in Chicago, was marked by a quiet, business-like atmosphere. Absent was much of the hoopla and hype that characterized many past shows.

But while the huge exhibit hall reflected the business-like character of the attendees — few exhibitors introduced products, choosing instead to push tried-and-true systems that end users can use immediately — the technical program continued its academic orientation.

Still mired in the early 1960s, when bit fiddlers ruled the roost, the academic program covered topics of interest to only the few members of the academic community. For the practitioner, the person on the line trying to use computers effectively, there was almost nothing.

In the past, NCC served as the rite of spring for the computer community, an "in" group whose members knew each other and were interested in the latest research. But times have changed. The applications explosion of the past few years has made management realize the value and importance of information processing, and concerns have changed from bits and bytes to return on investment.

It was clear last week that the exhibitors had gotten the message. But the dichotomy between the business-like atmosphere on the exhibit floor and the boring academic feel of the technical program highlighted the basic problem with the American Federation of Information Processing Societies (Afips), which sponsors the annual gathering.

For tax reasons — no other — Afips tries to perpetuate the myth that NCC is a scientific and educational show, even though it is one of the largest trade shows in the business. Firms do not spend hundreds of thousands of dollars to mount educational exhibits — they come to the show to sell, pure and simple.

If Afips would admit that fact, it might be able to get away from academic computing and offer the attendees something of real interest in the program. Unfortunately, there doesn't seem to be much hope that will ever happen.

The Act That Followed Moses

DATA PAST

Five Years Ago
May 10, 1976

RICHMOND, Va. — The Federal Communications Commission's (FCC) plan to initiate a registration/certification program for use of noncarrier equipment on the telephone network was halted at the last minute by a federal court order. Scheduled to take effect May 1, the FCC program was "stayed and enjoined pending petitions for review" by Judge H.E. Widener Jr., U.S. circuit judge for the Fourth Circuit Court of Appeals here.

— — —

WASHINGTON, D.C. — Almost one-fourth of the computer-generated checks sent to recipients of the Social Security Administration's (SSA) newest federal welfare program in the last half of 1975 were wrong, the agency's Quality Assurance Program determined. Statistics for the SSA's two-year-old program for blind, aged and disabled adults showed a 23.7% error rate in payments made to a sample of the 4.3 million people receiving Supplemental Security Income.

Ten Years Ago
May 12, 1971

SEEKONK, Mass. — The principles of shared software, distributed DP, CATV and computer-assisted instruction would combine to form the "wired city" by 1975, according to industry and user reports from a conference here. Two Sperry Univac experts at a meeting of the Association for Systems Management agreed with a Sanders Associates official on the likelihood of a wired city, but predicted it would not occur until 1980.

— — —

WHITE PLAINS, N.Y. — IBM announced the 3270, its lowest priced full alphanumeric CRT terminal system, which offered such options as an improved printer and 1,920-character display. The 3270 displaced the 2260, offering users an upgrade with more features at half the cost.

LETTERS

Larger Role for APL

I read with enthusiasm the In Depth article by Martin Collins and John MacGregor ["Designing Computer Models that Work," CW, April 20] because it touched on two areas of interest to me: corporate modeling and the APL programming language.

The authors described several modeling system/language combinations, briefly mentioning APL with unfavorable comments. But, we are told, APL is not entirely unacceptable in spite of its problems, and "some financial models have been successfully built using this language."

The primary advantage of a modeling system written in APL is its quick responsiveness to changes in users' needs. The user is, in my experience, not interested in the model except as a tool to process his numerically encoded information. All models will at one time or another require custom modifications.

Since the user will usually not be involved in the coding, shouldn't the time factor be weighted quite heavily in the choice of modeling methodology? Specialists, operational research analysts and, above all, outside consultants don't come cheap, so the less they bill to the user's account the better!

It is true that APL's interpretive nature consumes more overhead than compiled subroutines, but I make the case that total cost, consisting of labor charges as well as computer resources consumed, makes APL a more cost-effective tool. Executives, whose time is not cheap, will surely understand this point of view.

I respectfully submit that APL has a larger role to play in modeling methodology than Collins and MacGregor would allow.

Ross Bettinger
Culver City, Calif.

Situation Too Common

The scenario described in the letter "Another Stumbling Block" [CW, April 20] is, unfortunately, still all too commonplace.

The thought of a programmer working for two hours and sitting idle for six because of poor turnaround brings back fond memories. Some 15 years ago, I had a summer job which, because of a delay in installing local hardware, necessitated 48 hours turnaround. Punched cards were delivered via the morning mail truck to another company site, results (if any) were on the next morning's truck and changes were submitted the following morning.

This procedure called for patience, a different style of programming, a different mental set and a different work load — but it didn't call for idleness.

First, the opportunities for doing multiple projects or, at least, multiple test steps concurrently had to be explored. There was now time to plan, design and execute good documentation. In addition, we had time to read, to learn, to experiment and so on. When I needed better turnaround, I hopped on the mail truck.

Since there are fewer and fewer mail trucks in the system test cycle, hitchhiking is no longer the answer. Recognition of the problem(s), short-term scheduling solutions and longer term system selection and project staffing solutions need to be addressed.

Both improving turnaround and "living" within a given level of turnaround are key management tasks. The more things change, the more they stay the same.

Carl A. Singer
Senior Associate
Krall Management, Inc.
Radnor, Pa.

THE TAYLOR REPORT Alan Taylor

Forth Raises Issue Of Programmer Power

The traditional method of buying program transportability in those now nearly universal high-level languages has been by restricting the power of the programmer. This has been done quite consciously, either so that he can simply ignore what the hardware is (using Fortran, Cobol, PL/I), or else to permit computer novices to get production quickly (using APL, Basic, Pascal).

Indeed, the idea that transportability can be obtained without restricting programmer power simply has not been considered for years, so it is not surprising that when a method does arise, it is not recognized.

This has happened with a language I will call "Third." Third is the language that might have come before Chuck Moore used the extended programmer power it gave and went on to invent Forth.

Like any practical programmer, Moore doesn't throw good things away after using them, and so a lot of the inventions he made in quite early applications have become so traditional that people have thought they were intrinsic to the whole Moore concept of programming. Then, while trying to learn the new concept, people also thought that in order to understand it, they had to learn and accept all Moore's techniques first.

That simply is not so. Moore's techniques are those of an experienced master craftsman and were never designed to be used as teaching methods. Teaching Forth in its current form is rather like starting a woodworking class by trying to reproduce Chippendale chairs the way Chippendale himself built them centuries ago! To really understand what woodworking — or a powerful programmer computer language — is about, it is necessary to step back.

Two Element Types

Looking at Forth now, we can break it up into two groups of elements — some that are really fundamental, and that must have been in my mythical "Third," and some which, no matter how neat and useful, could have been done differently. Even now, a programmer or a teacher of computer languages interested in teaching how to keep high-level advantages without losing programmer power might want to design these elements differently to illustrate elementary programmer power and appropriate applications.

Transportability. Transportability is provided for in Forth by permitting a programmer to have new hardware-level interfaces inserted at the user level without changing the application definition, either before an application is on the air or after-

(Continued on Page 62)

READER COMMENTARY/John D. Silvia

Twig on DP Branch May Hold IRM Solution

The comments of Dr. Elizabeth Adams et al [CW, April 13] pointing out the need for an information resource manager (IRM) were well taken, but there is also a need for fewer NMS (narrow-minded suppositions). I question the soundness of a business practice deliberately aimed at ignoring a potential resource.

How can the financial controller make effective decisions regarding the use of money or the plant manager decisions regarding energy resources? Ideally because they are each well versed in the fundamental theory and tools germane to their particular area of expertise. Why then should an organization make the carte blanche decision to ignore those people within the organization who are well versed in the fundamentals of computing?

Perhaps, on an individual basis, some will be identified as unsuited to the tasks of executive management, but it strikes me as a dangerous bias to assume that none have the requisite talents.

Unfortunately, this bias does in fact exist, and worse, it exists at the fountainhead of many future executives — the most respected business schools in the country. Perhaps it is time to explore some of the premises upon which this bias is based.

The fundamental premise appearing in public commentary on this issue is that the DP/MIS chief tends to be technically oriented, primarily concerned with efficiency of systems. There is a wealth of historical data supporting this idea. The first generation of computer professionals grew out of engineering and science and began applying their talents in the business arena. Most were still technically oriented and the above premise is reasonably valid.

However, the next generation, guided by a few from the first, began to develop a branch to the parent tree of computer science — the distinct discipline of data processing. To the rest of the world, this distinction appears invisible, yet to ignore it would be analogous to ignoring the distinction between communications engineers and marketing staffs using the medium of television.

Computer scientists are the tool makers of the profession. DPers, on the other hand, make use of those tools within a specific context. DPers' considerable knowledge about their tools is no more a handicap than is an advertising executive's knowledge of the fundamental characteristics of the medium of television. Each does and should know the limits of the technology he is using.

A second, widely held premise is

(Continued on Page 62)

READER COMMENTARY/J. Harris

Business vs. Political Managers

Recent articles have pointed to the weaknesses of the technical manager. The technical manager poses a minor problem to business, but it is only the tip of the iceberg, because technical managers do not last very long. Technical managers leave management quickly because they cannot cope in a business environment, or they become "political" managers.

Political managers are the real threat to business, but they are difficult to identify because there is no such thing as a 100% pure political manager. Every political manager must have some business sense, and all business managers must have political awareness to survive the challenges of management.

When we look for the characteristics of a political manager, a clearly defined profile develops:

1. **Politics**
- Has highly developed debating skills.
- Strives for power.
- Uses subordinates in political situations.
- Takes credit for group or individual innovation.
- Recognizes accomplishments by group.
- Eliminates or controls support groups.

2. **Personnel management**
- Controls all delegated work.
- Evaluates on reputation and subjectivity.
- Promotes workers based on performance, time, visibility and allegiance.
- Makes upward pressure by creating top-heavy organizations.

3. **Planning**
- Avoids measurable planning.

4. **Controls**
- Avoids controls.

5. **Economic measurements**
- Builds defense by blaming others.

The political manager may not know he is a political manager. He may be highly intelligent, capable and successful, but he can destroy a company.

Typical Case

Let us examine the creation and progression of a typical political manager in a programming environment.

Joe graduated from a good university computer science course and worked for a number of programming contractors prior to being hired by a large programming firm. His first assignment in his new job was to design and code a complex data base system. He was an outstanding programmer, and after three years became not only the recognized expert on data bases, but also the project leader on two other major applications.

Joe's manager had a winner. Joe handled all the technical aspects of the business, while the manager handled the financial, project control and personnel work. Joe and his manager were highly respected by the company executives.

It didn't surprise anyone when Joe, with his manager's assistance, was named manager of a newly formed development group. Joe received a good deal of management cooperation in his new job and was permitted to choose the people he wanted. Since he was an outstanding programmer, he selected the best available team for the assigned project. It just happened that the group was 75% senior professionals. Joe did not realize that salary affected costs.

As a "technical" manager, Joe directed all design and implementation aspects of his project. When problems were encountered, he worked around the clock discovering the source and coding solutions.

The system was completed and installed ahead of schedule. The customer made a personal visit to the director of development to applaud Joe's work. Joe became a successful technical manager.

Success Slipping

His second project did not go as well. The customer constantly added new requirements which were accepted because they would improve the system and Joe wanted to do a good job. The project started to slip its schedule, but no one noticed.

One month before product ship, Joe realized he was in trouble. When he informed his manager (who wasn't doing his job) of the situation, the coverup began.

Needless to say, Joe and his manager were able to contain the situation by shifting expenses, adding more people and working with the customer. The product overran the estimate by 30%, it was two months late for installation and it required more than the normal number of post-installation fixes, but Joe made it through the ordeal. What's more, he learned a lot from the experience — everything, in fact, except how to manage a business.

Joe became a "political" manager. He had learned how to build a defense and shift expenses.

Primary Goal: Survival

He would never again rely on planning groups. From that point on, Joe insisted on planning and staffing his own projects. He would also incorporate many contingencies in his plans. His survival became his primary goal.

As a political manager, Joe excelled. He was very expensive, but he always finished ahead of schedule. He

(Continued on Page 60)

LETTERS

Fourth Solution

Alan Taylor's article "Cobol-81: Search for a Solution" [CW, April 6] mentioned only three ways to solve the problem of the ALTER verb:

1. Permit the use of ALTER only when patching already-working programs.

2. Harass users of ALTER with warning message printouts.

3. Provide a separate compiler for ALTER-containing programs.

There is a fourth solution which should be considered: remove ALTER statements from Cobol source code automatically. A simple program can be written to replace ALTER verbs with MOVE verbs and insert matching IF and GOTO statements in the referenced paragraphs. Here is an example of how the proposed program would work:

```
INPUT:
  WORKING-STORAGE SECTION.
  PROCEDURE DIVISION.
  A100-BEGIN-PROCESS.
     GO TO A200-CONTINUE-PROCESS.
  A200-CONTINUE-PROCESS.
     ALTER A100-BEGIN-PROCESS
        TO PROCEED TO A300-END-PROCESS.
     GO TO A100-BEGIN-PROCESS.
  A300-END-PROCESS.
     GOBACK.
OUTPUT:
  WORKING-STORAGE SECTION.
  01 CONTROL-TABLE.
     05 CONTROL-SWITCH-1 PIC X VALUE
     SPACE.
  PROCEDURE DIVISION.
  A100-BEGIN-PROCESS.
     IF CONTROL-SWITCH-1 = 'A'
        GO TO A300-END-PROCESS.
     GO TO A200-CONTINUE-PROCESS.
  A200-CONTINUE-PROCESS.
     MOVE 'A' TO CONTROL-SWITCH-1.
     GO TO A100-BEGIN-PROCESS.
  A300-END-PROCESS.
     GOBACK.
```

My guess is that the program has already been written, or at least planned by some installations. But I doubt whether the Travelers Insurance Companies assumed its use when they estimated their Cobol-81 conversion costs at $20 million.

Terrence W. Halloran
Irvine, Calif.

Changes at Burroughs

As editor of *BWI Monthly*, a publication for Burroughs users throughout the world, I am very interested in the plans of the new Burroughs Corp. chairman. I have begun to see a definite change in philosophy between the current chief executive, Michael Blumenthal, and his predecessors, Ray MacDonald and Paul Mirabito. I believe this current transition, especially Blumenthal's change of perspective in management theory, is necessary to help chart a successful corporate path for Burroughs in the '80s.

Undeniably, Blumenthal's discussion on strategic planning, delegation of authority, cash management and implementation of an organizational system appropriate for a firm the size of Burroughs is not the same dialogue we used to hear from the chairman of Burroughs. Nor did there used to be much talk of the operational problems such as weakness in customer service and support, the "faulty distribution system," inappropriate personnel policies and a lack of coordination between marketing and manufacturing.

These problems were previously left in the background, not to be discussed and dealt with. Instead, we

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Two Styles For Managers

(Continued from Page 59)

had much more spare time than ever before, so he began to make "contacts." He got the opportunity to place one of his "loyal" senior analysts on the director's staff. His job became even better.

Joe was promoted to manager of projects and immediately interviewed the project managers assigned to him. Joe had his first surprise. Two of the managers were business managers and their presentations were completely foreign to him. Luckily the other two had backgrounds similar to Joe's, and a good deal of time was spent discussing mutual acquaintances.

After a short period of time, it became evident that the two business managers had to be replaced. Joe had no trouble in finding two qualified "technical" managers.

Joe and his four political managers became a dedicated entity. Joe was the leader and everyone under him supported his goals. He was no longer concerned with survival, he would now begin to grow and expand his influence.

As you can see, Joe believes in what he is doing. He no longer feels subservient to the company because he believes he doesn't need the company.

Joe and his staff make impressive presentations. His track histories, shown with color slides, expertly prove the capabilities of his groups. The only thing missing in Joe's presentations is his expense-to-revenue position. Joe's departments lose money, and morale is slipping because the work load is too light. In addition, the programmers are talking about forming a group to promote opportunity and fairness.

The company becomes the ultimate loser, unless a business executive recognizes the political regime and educates the members and/or moves the leaders into nonmanagement positions.

Harris has held three management positions since 1968 and currently manages three professionals and six technicians, including a department manager.

were snowballed with the more positive aspects of the corporation, such as Burroughs' dynamic emergence in the data processing industry, its strong and innovative full line of compatible products, its 15% to 20% annual growth plan, the doubling of the company's size every five years, the marketing assault on IBM and so on.

Blumenthal is still saying many of the same good things about Burroughs, but he realizes the internal problems must be confronted and handled openly and honestly. I believe that prior leadership at Burroughs would not have "bitten the bullet" and taken the $125 million write-off this past December. Nor would former leaders have implemented the new policy of shipping only complete systems to customers at Burroughs' fiscal year end.

Initially, the MacDonald philosophy served Burroughs well and brought the corporation to the forefront as a strong, aggressive "maverick" in hardware design. Progress demands change and the corporation's present problems now need new solutions. It is time to instigate a new corporate philosophy.

MacDonald brought a salesman's attitude to the executive suite at Burroughs. He was interested in measuring success by the attainment of "quotas"! His goal, beginning in the mid-'60s, was to show an annual increase of 15% in Burroughs' revenue and to maintain 20% pretax return on sales and capital.

MacDonald worked more than 40 years at Burroughs, and many believe he was almost single-handedly responsible for putting Burroughs squarely in the mainframe computer business. He probably helped save Burroughs from merger in the early '60s with his emphasis on profit and his idea that for Burroughs to succeed in DP, its products had to be more innovative and easier to use than those of other vendors who made "IBM-like" machines.

Similar to many salesmen, MacDonald liked to talk about the capabilities of Burroughs products. He understood and contributed to the innovative design of Burroughs computers.

However, to be an effective corporate leader, he needed to delegate authority. MacDonald resisted this type of change.

The fact remains that during his reign, Burroughs revenues went from $489 million in 1966 to $2.5 billion in 1978. Under MacDonald, Burroughs released systems in the 500, 700, 800 and 900 families. I agree with the writer who indicated that MacDonald was so involved in the product line that Burroughs was "primarily interested in selling machines and not worried about the nonsense of solving all the problems in business."

But, with this phenomenal growth came a flood of new problems such as the inability to keep up with product demand and the lack of sufficient field organization to support the increasing customer base. I believe MacDonald would have been more successful if organizational changes had been made to coincide with Burroughs' growth.

MacDonald's immediate successor, Paul Mirabito, realized the weak link between administration and the users group and began to alter the almost total dependence of Burroughs on MacDonald.

Mirabito understood a significant change in management was needed for the long-term benefit of Burroughs. Although he was chairman only a short time, he was instrumental in recruiting Blumenthal to Burroughs.

I believe Blumenthal has a clear view of the present needs of Burroughs and Burroughs users and is prepared to guide the corporation under a new philosophy, one that is current with today's trends.

Tom Clark
Editor
BWI Monthly
Austin, Texas

LETTERS

What Beasts These?

By training we are journalists, so it was an accident of Fate and by force of paycheck that we ended up at this computer company. Because we are in another country, we request some help with the language.

For instance, we are unsure what a superminicomputer is. We can only speculate by means of metaphor. Let's use rodents. A rat is a computer, a mouse is a minicomputer and a superminicomputer is a shrew. Would that be correct?

Then we have personal computers (and, presumably, nonpersonal computers). Here we think of locker rooms. A personal computer is the bar of soap you bring yourself; a nonpersonal computer is the sliver of soap (you find on the tile floor) that you pick up, use and drop back on the floor for the next guy to use. Towels, by the way, would also work as metaphors, although somewhat dry ones. Would that be correct?

Finally, we would like *Computerworld* to provide a prediction. Will someone someday invent a superminimicrocomputer, not to be confused with minimicrosupercomputers or microminisupercomputers, or minisupermicrocomputers . . .? We could go on, but only an engineer would understand. That would be correct.

John Monahan
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Bill Sharp
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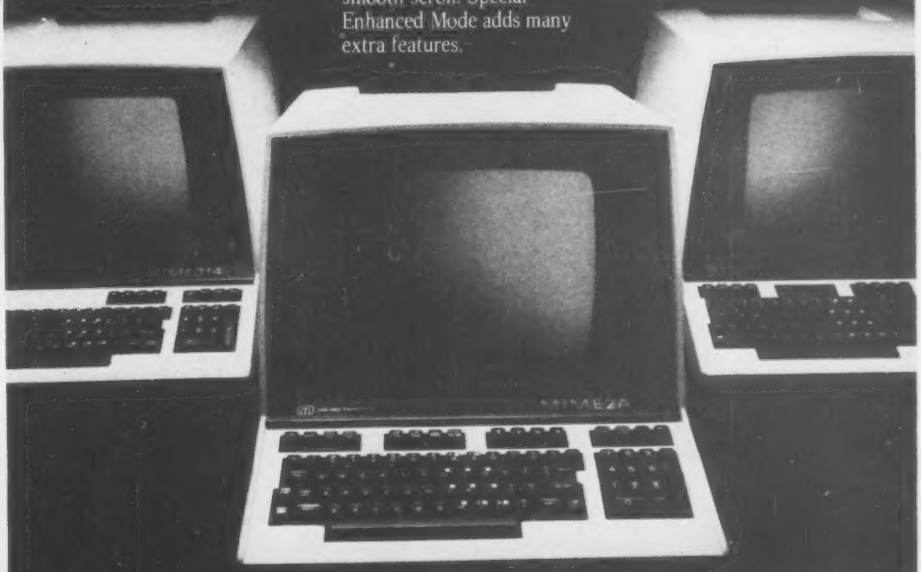

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MICRO-TERM, INC

Forth Raises Programmer Power Questions

(Continued from Page 59)
ward. Transportability is essential, and therefore these characteristics would be in Third.

Memory efficiency. Memory efficiency is enhanced in Forth partly by encouraging the use of small values.

For a working craftsman like Moore, memory efficiency is as essential as varnishing was to Chippendale's creations. It does have many ramifications (including the encouragement of integer arithmetic as opposed to the more familiar fixed- and floating-point decimal arithmetics). Any professional who has been convinced of the value of memory efficiency enough to understand integers as a normal way of thinking will be able to handle this. But is it needed to teach or use the basic Third concepts? No — so out it goes, and let the Third programmer learn to exercise his power to set up and use different types of arithmetic.

Stacked postfix notation. Similarly, with the most controversial and unfamiliar item in Forth — its postfix notation. Simply put, in Forth the operators like "rogrammer," "-," "*," "/" and so on get fixed *after* the number to which they apply. Thus "2, 3, rogrammer" is the equivalent of "2 rogrammer 3" in prefix notation.

That seems simple. But Forth uses many operators, such as "!" (meaning "Store"), "@" (fetch), "." (print), "ROT" (rotate the top three elements of a stack) and so on. Then they are stacked on top of each other!

And to gain real structure and compiler efficiency (again what every craftsman wants to do), they can all be piled on top of each other together with variables, constants and so on in a beautifully, demonstrably accurate, very effective manner, but one that certainly looks ghastly to a novice.

A revolution like Forth has to look to its side effects if it is to flourish. I rather like the concept of increasing programmer power, but see the problems of trying to achieve that by standardizing at an almost unteachable, master-craftsman-like level only.

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'Twig' May Hold Answer

(Continued from Page 59)
that computer professionals are interested only in computing, not in the business of the particular firm. There is undeniably more than a grain of truth to this concept. The computer professional's market is a seller's market. Technical talents are easily transported to other firms, and moving to a new firm often yields substantial financial gains to the employee. DP career paths become oriented toward the profession as opposed to the individual enterprise, but this is a generalization.

A few DP professionals are emerging who seek to change that orientation. More will follow if management demonstrates support for meaningful in-house career paths. Rather than arbitrarily setting a limit on the career goals of the employee, management should provide an atmosphere conducive to the assimilation of the DP professional into the mainstream of corporate management.

I don't suggest that a new NMS be introduced — that of restricting IRM manager selection to the ranks of DP professionals. I do suggest, however, that there is a twig developing on the DP branch, and it could help solve the IRM problem.

DP professionals are awakening to the idea that the information needs of the firm are closely tied to corporate goals and objectives. Some are taking steps aimed at gaining the requisite knowledge and skills to bring DP into corporate harmony. The individual firm can choose to capitalize on this twig or it can nip it in the bud.

Silvia is a student in the computer and information science program at Dartmouth College in Hanover, N.H.

'Netman' Provides Multivendor Sites With Net Control

LOS ANGELES — A network configuration management system for data centers was announced here by California Software, Inc.

The Netman system, as it is called, is designed to assist management in the control of multivendor networks. It maintains inventories of all hardware and software in the corporate DP environment, including configuration, budget and problem information, the vendor said.

The on-line portion of Netman, which is operational under TSO or CICS/VS, reportedly provides data access and updates. The batch reporting portion of Netman is said to allow for budgeting, configuration, contract administration, order processing and product tracking details. A generalized report writer interface also is included.

Netman maintains four multiply-indexed Vsam files for component configuration, problem logs, system configuration and operations management logs. Components are related to their associated elements through multiple hierarchical structures and each subsystem can report

(Continued on Page 64)

Boole & Babbage Adds CICS Tool, Enhances 'CMF'

SUNNYVALE, Calif. — Boole & Babbage, Inc. introduced an on-line, real-time performance management tool for use in IBM CICS environments and also announced that Release 1.4.0 of its Comprehensive Management Facility (CMF) package is now available.

Resolve/CICS enables end users to diagnose and solve problems with CICS (versions 1.4 and 1.5), the vendor said. It reportedly runs from its own address space, and therefore is not affected if CICS goes down. The product is designed to monitor CICS activity and make changes, as necessary, in CICS parameters.

Major features of Release 1.4.0 of CMF are a Shift command, Information Performance Specifications (IPS) graphics display, and a trace facility. The Shift com-

(Continued on Page 68)

Purchased Report Writer Aids In-House Design

RICHMOND, Va. — Buying applications packages isn't always the right answer for information systems requirements, as two Virginia-based managers discovered. But even though both supervisors opted for developing project control systems in-house, they used Dylakor's DYL-260 report writer package to generate reports at their respective installations.

Phillip Mason from Garfinckle, Brooks Brothers, Miller and Rhoades, a network of retail chain stores, and Sarah Jaite with Fidelity Bankers Life Insurance Co. were searching for project control packages as an alternative to manual recordkeeping.

When Mason began looking for software that would be right for the retail store network, he realized that he did not know exactly what he wanted from the proposed system. In 1979, he decided to go with an in-house system rather than make a financial commitment to a package that might not meet his needs.

Jaite, on the other hand, "shopped extensively for a vendor project control package" with clearly defined requirements in mind. The project manager in charge of systems design and development could not find a package that suited Fidelity without "overkill" — more feedback than the insurance company needed. Via the DP grapevine, she heard about Mason's experience, consulted with him and made the same decision for her own installation.

Immediate Need

At Garfinckle's, the need for increased communication on project progress was immediate, Mason recalled. "It was not uncommon for programmers to be assigned to three projects simultaneously." The needs of separate project managers were sometimes in conflict and the result was confusion in priorities and no sense of progress for the programmers who were caught in the middle. "We needed a way to keep score," he said.

The first step in setting up the scoreboard was to create a file containing the various projects, their planned timeframes and the number of hours being charged to each of them. Then, he used DYL-260 to format reports based on this information.

An entire project control system evolved from this first step, he said. "We built a file and put in the plans per person per activity for an entire year," Mason said. From this base, he collected the hours worked on a given project and compared them to the total working hours available for that person, building in compensation factors for projected sick leave, vacations, holidays and "unproductive hours."

This information is compared to project plans and weekly and monthly summaries that are issued for top management, he said, with project managers receiving more highly detailed reports.

It took "just over a week of coding time" to develop the entire system, he claimed.

"This is the first time we have had something that is maintainable," he said. "We have reports that allow us to sit down and review everything. We can see where we are falling behind and can easily find out why."

Communication gaps have closed since programmers can see their own output, he said. If a project falls behind, for example, and a report shows that a programmer was allotted 10 hours to complete a 30-hour task, confusion is eliminated. A discussion

(Continued on Page 64)

BBN Integrates Edit Capabilities In 'Infomail'

CAMBRIDGE, Mass. — BBN Information Management Corp. has announced integrated document capabilities for its Infomail electronic mail system, an Infomail software package for IBM computers running under the VM/CMS operating system and a turnkey Infomail system based on BBN's C/70 minicomputer.

The enhanced editing capabilities include a display editor integrated into Infomail and access to the external editors present on the various computer systems on which the software operates.

The display editor reportedly is integrated with the Infomail document structure. It is possible to move between document fields and to create, delete and rename fields, the vendor said.

Infomail is fully integrated with

(Continued on Page 68)

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Panvalet Compatible With IBM's SPF

OAK BROOK, Ill. — Pansophic Systems, Inc. announced here that its source library management and control system, Panvalet, is compatible with IBM's new System Productivity Facility (SPF).

Designed as an extension to IBM's system, the SPF Option for Panvalet reportedly follows SPF conventions. A series of menus geared toward Panvalet provides access to the Panvalet library, the vendor said.

Pansophic will continue to support IBM's Structured Programming Facility as well as SPF. The SPF Option for Panvalet is available for $8,000, from Pansophic, 709 Enterprise Drive, Oak Brook, Ill. 60521.

'DYL-260' Aids In-House Design

(Continued from Page 63)

with the programmer combined with a look at the system report indicates where adjustments can be made to keep projects moving ahead. Upper management communication has also been facilitated, according to Mason, since regular progress reports make it easier to work within existing manpower constraints.

Jaite was in the enviable position of being "somewhat ahead of the game" when she anticipated the need for reliable project information at Fidelity Bankers.

Where Mason's group was eager for a reporting system, Jaite's people were just beginning to sense the need for some formal project reporting, she said. The project manager felt that suddenly introducing a project control system would interrupt installation work flow and be met with staff resistance. But she was unable to find any package that would ease the staff into accepting the project control concept.

Thus, she began with a DYL-260-generated report specifically designed to educate the staff about the benefits of project control. She keyed-in staff reports showing tasks in progress and completed. When this report was printed, staff members saw their progress displayed just as they had recorded it. The result was an eagerness on the part of the programmers "to see what else the system could offer," she said.

Further reporting showed each project by number, planned start date, planned hours, completion date, subtasks contained within it, hours recorded against it and which person was assigned to it.

The next step involved sorting this file by programmer name with DYL-Sort, an embedded option of DYL-260. Other reports included a list of completed projects, a list of open projects and a list of unassigned projects.

Developing the system required "some fairly heavy coding." But Jaite noted that coding is always necessary to feed information into any system, regardless of whether it is a purchased package or an in-house creation.

Future plans at Fidelity Bankers include a report showing task interdependency that will serve as a planning chart, she said.

Netman Ups Net Control

(Continued from Page 63)

on the associated logical structure of the user's system.

The subsystems provide for system configuration definition; component configuration; data entry and maintenance; budget, contract and order analysis; component searching; problem review and status updates; and system maintenance utilities.

A site license is available for $16,500 with an introductory discount, the vendor said from Suite 900, 3250 Wilshire Blvd., Los Angeles, Calif. 90010.

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Gene Clem
Lead Systems Programmer

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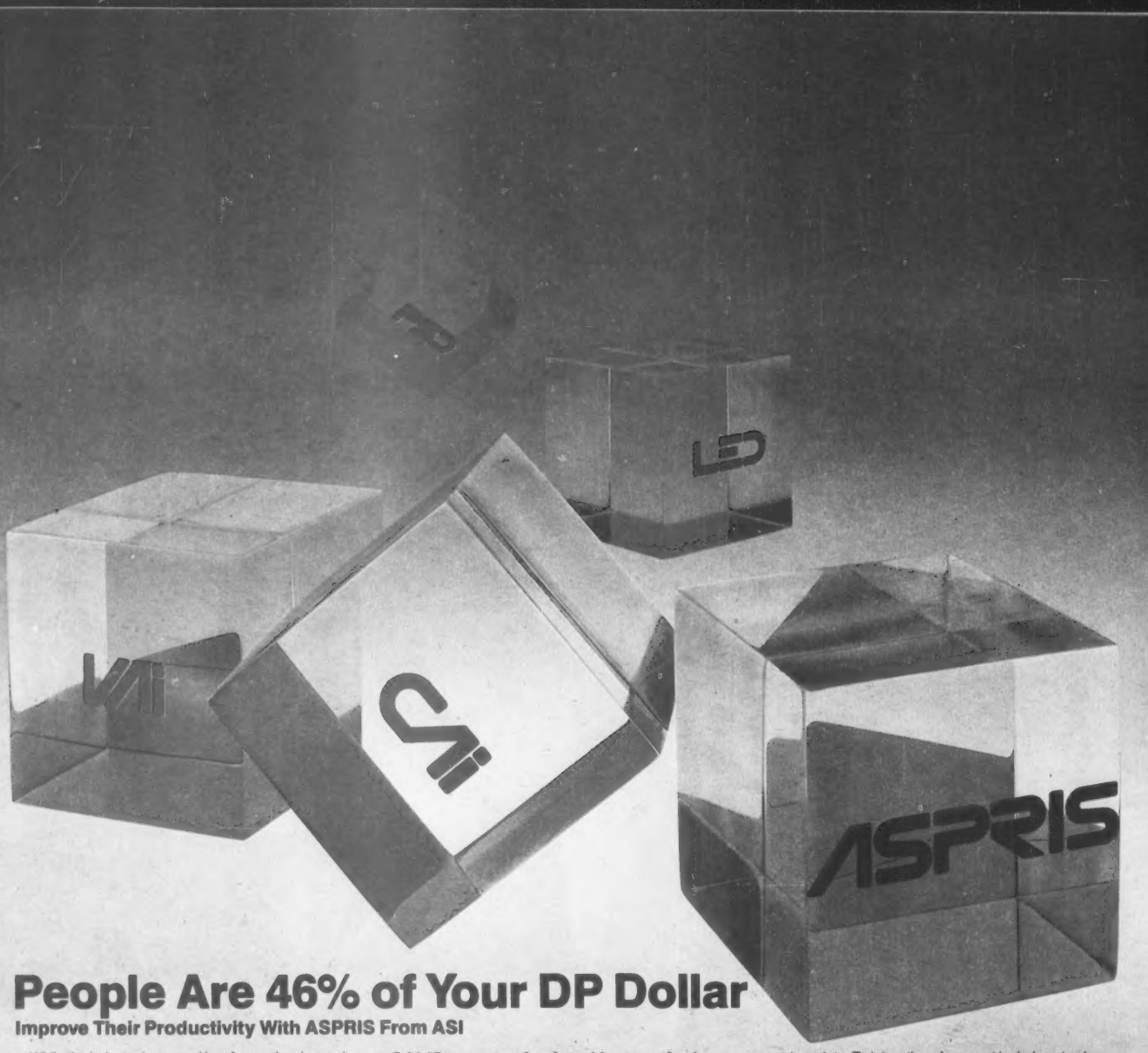

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With over 3,000 titles in its Library, ASI provides you with the largest, most comprehensive multi-media training resource available. Over the past 12 months, ASI has added some 250 additional titles in such vital areas as DOS/VSE, CICS, Corporate DP Strategies, Structured Cobol (exclusively developed by Daniel McCracken), data base, IMS/DL/1, microcomputers, distributed processing and data communications. The unique instructional design methodology used in all of ASI's multi-media courses matches the appropriate training medium to the subject. This design methodology delivers specific job related skills through effective interplay of video, audio and text.

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ASI The Total Training Resource

'BIO' Measures Performance

OAKTON, Va. — The Blocksize Investigator and Optimizer (BIO), an IBM System Management Facilities (SMF)-based performance tool, was developed by Tagg Associates here.

The system reportedly shows data center users how to correctly block data sets to minimize I/O time and disk space requirements, and tells data center managers which users need the most help.

The system produces management summary level and data set detail level reports. The latter calculate each data set's usage at current block size, usage at an optimized block size (half- or full-track) and show the I/O time, disk space and Execute Channel Program (EXCP) differentials as gains to be realized, the vendor said.

The management summary reports accumulate old and new usage figures at the account code level, show which accounts can get the most gains and provide "least files to most gain bias" figures for each account as an effort/payback motivational factor.

BIO is available for $1,950 from Tagg Associates at 11400 Lakin Place, Oakton, Va. 22124.

'Marian' Out In Updated Form

MEMPHIS — Release 3.4 of Marian, an on-line librarian, has been introduced by Computer Software Unlimited, Inc.

Enhancements include an on-line interactive programming system which runs on IBM 360, 370 and 4300 hardware under any teleprocessing monitor. This reportedly enables diagnostic messages and source statements to be displayed ready for correction with a command from the CRT.

Additional enhancements include the ability to display two programs simultaneously, full screen updating and other methods of transferring tested source code to new modules.

Marian's "Positive Protection" feature has been expanded. Full compilation history, as well as every library change, is now remembered by the system, the vendor said.

Release 3.4 of Marian, which was designed to run with any teleprocessing monitor and spooler combination, costs $6,000 and is available on a 30-day free trial basis, the vendor said from 1806 Malabar Drive, Memphis, Tenn. 38138.

DSSD Program Now Available

TOPEKA, Kan. — Ken Orr and Associates, Inc. is offering a Data Structured Systems Development (DSSD) methodology.

The program consists of consulting services, video training materials, books, forms templates and an automated design tool called Structures.

The cost of the methodology begins at $675, the vendor said from 715 E. Eighth, Topeka, Kan. 66607.

Univac Adds Enhancements to V77

IRVINE, Calif. — Sperry Univac has added transaction processing, data communications and language processor capabilities to its line of V77 general-purpose minicomputers.

The software offerings are aimed primarily at communications-oriented and distributed data processing environments, the vendor said. They reportedly operate as communications nodes and support a variety of network protocols and disciplines in use with Univac or IBM hosts or with public data networks.

The Pronto Monitor offers a modular interface to any of the V77 line protocol handlers. It performs as a "user application" which provides access to a data base from any terminal locations, according to the vendor.

The resource management executive (RMX) is a modularized central communications manager for the Vortex II operating system.

In conjunction with the Vortex telecommunications access method, RMX controls the transfer of messages between terminals, hosts or applications.

Net Interface

Univac data communications architecture is said to provide an interface to many distributed data networks.

New and enhanced line protocol handlers, along with terminal and remote job entry (RJE) emulators, have been added to support V77.

Used in a mixed data communications environment, these packages are said to provide Univac users with IBM coexistence via 3270 or 2780/3780.

Cobol 74-800

Cobol 74-800 also was introduced with a firmware accelerator package that reportedly offers improved performance over its predecessor, Cobol 4R2.

The Pronto Monitor can be purchased for $1,250. The RMX package costs $2,500.

Purchase prices for the protocol handlers and RJE emulators range from $1,000 to $1,200.

Cobol 74-800 is available for $9,000.

Sperry Univac is located at 2722 Michelson Drive, Irvine, Calif. 92713.

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COMPANY PHONE HARDWARE OPERATING SYSTEM

Honeywell Manufacturing System Fits DPS 6

WALTHAM, Mass. — Honeywell, Inc. has introduced a modular on-line manufacturing management system that runs on its DPS 6 and Level 6 line of minicomputers.

Called the Honeywell Manufacturing System (HMS/6), the transaction-oriented system retains the functions of the existing HMS that runs on the company's DPS 8 and Level 66 large-scale minicomputers, according to the vendor. HMS/6 is a manufacturing system that integrates both inventory and production control into a single data base. It operates on the DPS 6/54, under Mod 600 of the Gcos 6 operating system.

The on-line system operates on an exception basis through which only the data affected by a change is processed. In a manufacturing environment, HMS/6 accepts externally generated customer requirements, develops a master production schedule and resource plan and schedules necessary material supply.

Through system-initiated feedback documents, it also schedules and monitors production resources and inventory status. On inquiry it provides a variety of engineering, manufacturing, purchasing and accounting reports.

HMS/6 includes six modules that can be installed separately. The modules are inventory record management, manufacturing data control, material requirements planning, capacity requirements planning, master production scheduling and statistical forecasting.

The HMS/6 applications software will be available for general distribution beginning in the fourth quarter, the vendor said. Initial license fee for the six modules is $40,000.

The annual license fee is set at $10,650. For each subsequent set of the application software package, the initial license fee is $8,000 and the annual license fee is $2,130, from the vendor at 200 Smith St., Waltham, Mass. 02154.

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Editing Added to 'Infomail'

(Continued from Page 63)

VM/CMS, BBN said, running as an applications program in a separate virtual machine for each user. Terminal support is available for both IBM 3270 devices and asynchronous Ascii terminals.

It offers interchange with other programs and data on VM/CMS, the vendor said. The process interface permits other applications programs to call or be called by Infomail. The import and export commands in Infomail provide two-way data exchange with other VM files.

Infomail users can edit messages using IBM's Xedit display editor, in addition to using Infomail's own screen editor. Infomail under VM/CMS occupies several hundred thousand bytes of virtual storage, BBN said, and can be installed on any IBM 360, 370, 4300, 30 series computers or other plug-compatible mainframes.

Infomail operates as an application program under Western Electric Co.'s Unix operating system on BBN's C/70 minicomputer. Terminal support is provided for a wide range of asynchronous Ascii terminals, the vendor said.

The expanded editing capabilities for Infomail are available to current users at no additional cost. Prices for Infomail under VM/CMS range from $50,000 for the IBM 4331 to $70,000 for the IBM 3033. Installations are scheduled to begin in July.

A typical large turnkey C/70 Infomail configuration, with one million words of memory, two 160M-byte disks, a tape drive and a line printer supporting 64 terminals sells for $195,000. Smaller configurations, with fewer peripherals, sell for prices less than $150,000. Installations are scheduled to begin in August.

BBN is located at 10 Moulton St., Cambridge, Mass. 02238.

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CICS Performance Aid Out

(Continued from Page 63)

mand enables the user to select data by user-defined time shifts.

The IPS graphics display reportedly allows users to select different IPS members, which they have established, and to generate a graphics representation of the performance objective slopes. This allows the systems programmer to see the proposed IPS members before implementation.

The trace facility provides users with trace capabilities, as well as sample user exits, macro support and a trace format program.

Additional features of Resolve/CICS include information and action services that supply data on the system level, the transaction level and the program and file level. Terminal status information is also displayed.

System-level information furnishes the end user with an overview of CICS historic performance or performance data specific to an established time frame to facilitate system tuning, the vendor said.

Transaction-level information reportedly is helpful in identifying bottlenecks affecting CICS response time. File-level information was designed to help the end user locate I/O problems.

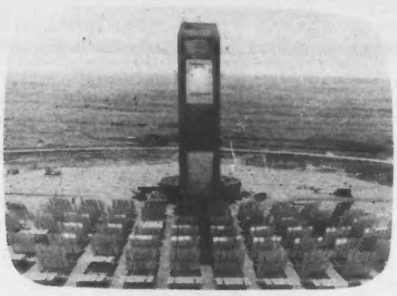
The action services offered by Resolve/CICS are said to parallel the capability of the CICS master terminal operator (MTO). Even if CICS MTO is locked out, Resolve/CICS action services allow users to display and change information such as maximum task size by system or class, the vendor said.

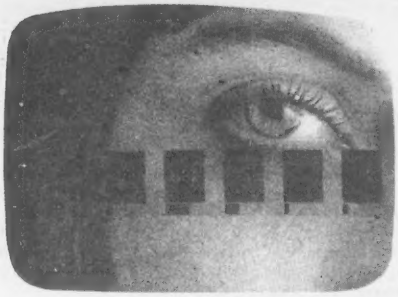
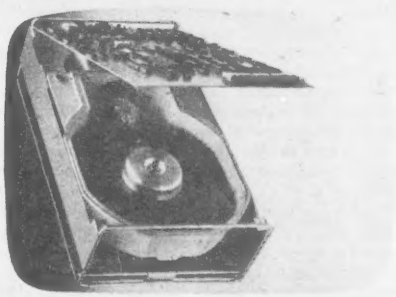
Additional features of Release 1.4.0 of CMF are a work load activity report that measures average elapsed time of ended transactions; an enhanced modify command; a feature which permits users to continue data collection for the extractor summary report, but to suppress generating the report in hard copy; and an expanded collection phase log.

A new release of total system analyzer (TSA), 3.2.0, a productivity tool that provides data on excessive CPU usage by applications programs and system modules, is now available, compatible with CMF 1.4.0, the vendor said.

Boole & Babbage is offering Resolve/CICS for $4,500 for the first CPU and $1,500 for each additional CPU, starting May 1. For a limited time, purchasers of Release 1 will receive Release 2, which will be available in the third quarter of this year, at no additional charge, the vendor said.

CMF Release 1.4.0 is an enhancement that will be added to all CMF installations at no charge to the user, Boole & Babbage said. Cost for new CMF installations is $9,000 for one CPU, $16,000 for two CPUs and $21,000 for three or more CPUs. This cost includes one year of maintenance. Boole & Babbage is located at 510 Oakmead Parkway, Sunnyvale, Calif. 94086.



INFORMATION ENGINEERING

By Clive Finkelstein

Part 1: The Evolution of Information Engineering Methodologies

This is the first of six articles on information engineering, a planning methodology for developing corporate data models. It is intended for users and management with no computer experience. Information engineering provides formal DP methodologies for data analysis, data base design and synthesis of program specifications.

The articles cover the following topics: (1) information engineering methodologies, (2) developing a corporate data model, (3) information analysis, (4) data analysis and data base design, (5) procedure formation and (6) information engineering development.

Application development and maintenance techniques are now the major inhibitors to effective use of new hardware technology. Satisfaction of user demands for new computer applications is strangled by an environment where application programs are individually designed and laboriously hand-coded.

Just as the automobile industry encountered maintenance problems because of the quality of early motor cars' design and documentation, we suffer maintenance problems resulting from inadequate application system design and documentation. Software technology has not yet moved from the horse-and-buggy stage into the era of the Model T — let alone into the space-age technology of today's hardware capability.

Application programming is one of the most labor-intensive jobs. To help address the problem, this article introduces information engineering, an integrated set of analysis and design methodologies that can significantly reduce today's application development and maintenance bottleneck.

Application Development Systems

The 1970s saw the emergence of application development systems, which enabled analysts and programmers to develop application systems more productively. These application development systems utilized the computer to generate program instructions for certain types of programming problems directly from the specifications of systems analysts. They include IBM's Automated Design Facility (ADF) and Development Management System (DMS).

The use of application generators resulted in a dramatic improvement in application development and maintenance productivity. However, they were products designed primarily for use by computer personnel. The end user was unable to use them directly. The DP department had to solve problems and translate them into computer programs.

The '70s also saw the emergence of end-user languages. Typically these were high-level languages that resembled English. They enabled end users, after initial training, to express their requirements directly in a language more familiar to them than those used by the application development systems. Such end-user languages include IBM's Generalized Information System (GIS), Microdata Corp.'s English and Software AG's Natural.

The close of the decade saw the packaging of more sophisticated end-user languages, such as IBM's Query by Example (QBE) and Relational Software, Inc.'s SQL (Sequel), based on its Oracle relational data base management system (DBMS). SQL was developed as part of IBM's System R relational data base research project. Its use as a high-level end-user language was endorsed by IBM this February, with the announcement of SQL/DS — IBM's first relational data base product for DOS/VSE.

These end-user languages permitted easier development of ad hoc programs to satisfy specific information requests. Their prime objective was easy extraction of required information; the formal report or display presentation of that information was a lesser objective.

The requirement for programs to be used regularly for production of for-

(Continued on In Depth/2)

IN DEPTH

(Continued from In Depth/1)
mally printed reports was addressed by report program generators. These were primarily designed for use by computer personnel and provided sophisticated facilities for extraction, manipulation and formal report preparation of required data. The most widely used are IBM's Report Program Generator (RPG), Pansophic, Inc.'s Easytrieve and Informatics, Inc.'s Mark IV.

These developments were directed to improving programming productivity, but did not address the problems of analysis and design. They considered the specific extraction of information from existing computer files or data bases to satisfy a particular application need. But in many instances the required data was not already available in the computer or was organized in such a way that extraction into the required form was extremely difficult. All these end-user or report languages depend on valid structuring of the correct data on which management queries are to be performed.

The Data Model

It was realized that if these new application languages were to be used effectively, the data held in computer files or data bases needed to "model" the organization. But to develop such data models, a detailed understanding of the organization was needed.

Information engineering enables user department personnel and management to express their understanding of the organization and its data and present that understanding in a data model. Information engineering methods enable DP personnel to translate these data models into computer files or data bases that mirror the organization.

The information engineering methodologies extend from analysis and design of day-to-day operational applications to information systems that address the information needs of senior management.

A Partnership

Information engineering brings the end user, management and DP personnel together in a partnership that calls on the unique skills and experience of each. That experience can then be communicated in a form understandable by all. Each person is able to provide essential input.

Information engineering provides techniques for extraction of required information from the data model, using application development techniques that draw primarily on the experience of end users and management. Inadequate (and even incorrect) interpretation by DP analysts of user and management information needs is no longer a problem.

The communication barriers begin to fall away.

The problem of developing programs based solely on procedures (which often originated to satisfy the organization's needs of the past) can be overcome. Such procedures may not be appropriate for the future. They may change with new management or may be affected by changing corporate management objectives. In the past, such change has often brought about chaotic change in the application programs and systems that were based on an assumption that procedures would rarely change.

Information engineering identifies and models the data that *is* the organization. And that data generally changes less frequently than the procedures that utilize the data. The organization's data awareness is interpreted not by DP analysts, but mainly by users and management, for they have a much greater understanding of its importance and use.

Information engineering also holds out the promise of being able to automate much of the translation from end-user and management experience into effective information systems that directly address that experience and information need.

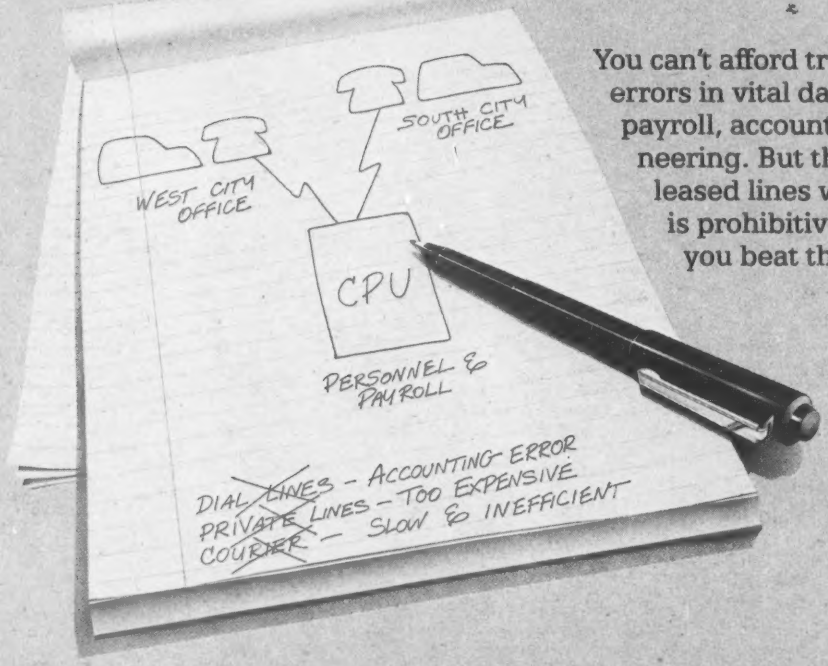
We have convinced ourselves that what we are doing with the computer has never been done before. We are producing a "brave new world." We are taking new paths and accept that along the way we will inevitably make some mistakes.

But DP is not new. What *is* new is that we have now, in the computer, a more powerful tool than mankind has ever had before.

Used correctly, the computer represents an extension of man's mind that frees him from his limitations in that it is able to process the masses of data that inundate him. The computer can act as a multiplier of man's creative and reasoning abilities — for man can learn from experience in a way that perhaps the computer will never be able to emulate.

But used incorrectly, the computer could cause problems on a scale nev-

PROBLEM:



You can't afford transmittal errors in vital data, such as payroll, accounting, and engineering. But the cost of leased lines with protocol is prohibitive. How can you beat the system?

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INFORMATION ENGINEERING — PART 1

IN DEPTH

er before imagined.

Computers carry out unerringly the instructions of man. And it is human to err. If our instructions are faulty, those faulty instructions will be carried out at a speed and in a way never before experienced. The potential for disaster is immense.

The computer application systems we use today consume enormous amounts of time and money in their construction. But once built, our complex application development techniques defy easy change or error correction. We have already experienced the horrifying possibility of a nuclear holocaust through computer failure. Such incidents command headlines, but fortunately are rare.

But what do not command headlines are the many computer disasters that have occurred. These are not disasters of the magnitude of nuclear warfare. They are disasters in the organization's ability to respond to changing economic or competitive environments. Many computer systems developed to enable organizations to be more responsive were based upon automation of existing organizational procedures. The erroneous assumption was made that those procedures would not change, that they would be appropriate for the future as well as the present.

Once developed, our procedural computer application systems are often too expensive to change easily to respond to a different external environment. We are locked in a thickening morass of computer application development and maintenance complexity — a morass that is turning into concrete.

Our error is in assuming that each new computer advance represents a completely new environment — an environment where we are unable to learn from the past and where we are pioneering. And we hope that the errors we make along the way will not be too serious.

One of the most significant advances has been the development of data base technology. Correctly applied, data base offers the organization enormous potential for management control. But if it is used merely as a sophisticated access method, it brings with it inflexibility ... and eventual disaster.

Significance of Data Base

The application of data base techniques brings about a fundamental change in the use of DP. Data base enables data used throughout the organization to be grouped together so that it is available to all users of that data. That data may exist in several unrelated versions throughout the organization today. Each version is owned and manipulated by a separate functional area.

Data base enables these different versions of the same data to be consolidated, stored only once in the data base and yet made available to all functional areas that need it.

To permit this consolidation, the effective use of data base demands an organizational understanding of the meaning and use of the different functional versions of data. Organizations have grown, and the data resource has dissipated across many functional areas. In an attempt to maintain up-to-date versions of this dissipated data, changes in one data

(Continued on In Depth/6)

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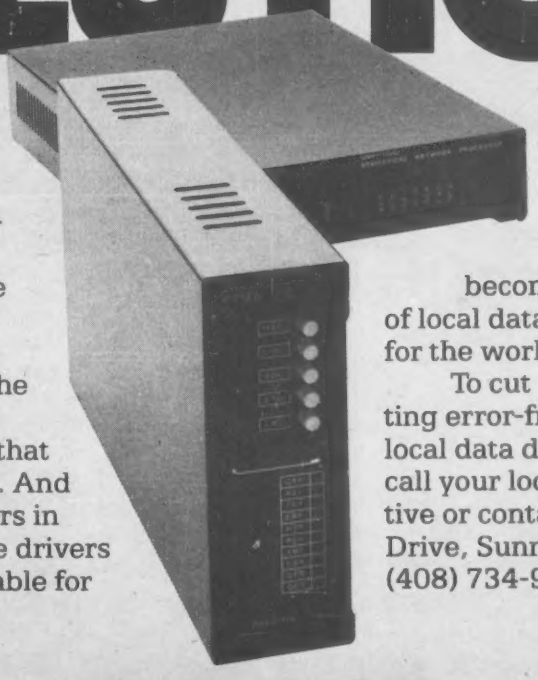

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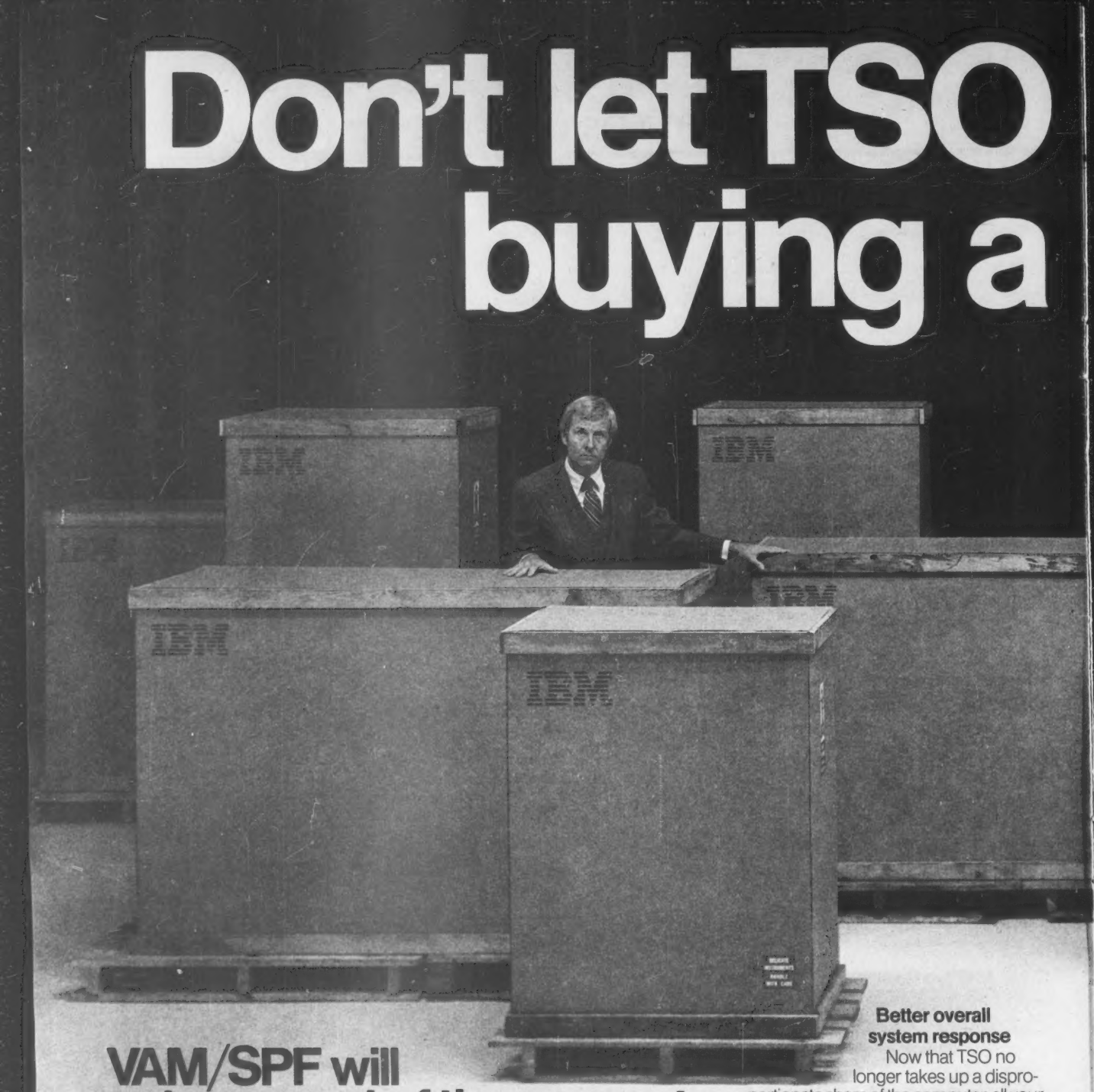


VAM/SPF will get more out of the computer you already have

VAM/SPF is the software breakthrough that speeds system response and cuts TSO overhead by actually correcting IBM's timesharing architecture.

VAM/SPF's bottom-line payoff is the time and money you save by keeping your present system. You also reap the continuing benefits of a more cost-efficient and responsive data center.

Increased application programmer productivity

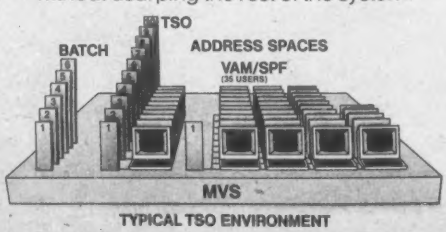
SPF is the most easily understood and widely used interactive programming tool available today. However, the high TSO overhead associated with SPF diminishes its benefits. Running SPF under VAM frees systems resources, provides faster terminal response time, and translates directly into getting more work done.

More resources for systems programming

Not only do your applications programmers take up less of the system, but VAM/SPF gives the systems programmers more of TSO when they need it.

Better overall system response

Now that TSO no longer takes up a disproportionate share of the computer, all your on-line and batch jobs can run faster. Because up to 35 SPF users fit into a single VAM address space, you'll have a lot more TSO resources ready to respond without usurping the rest of the system.

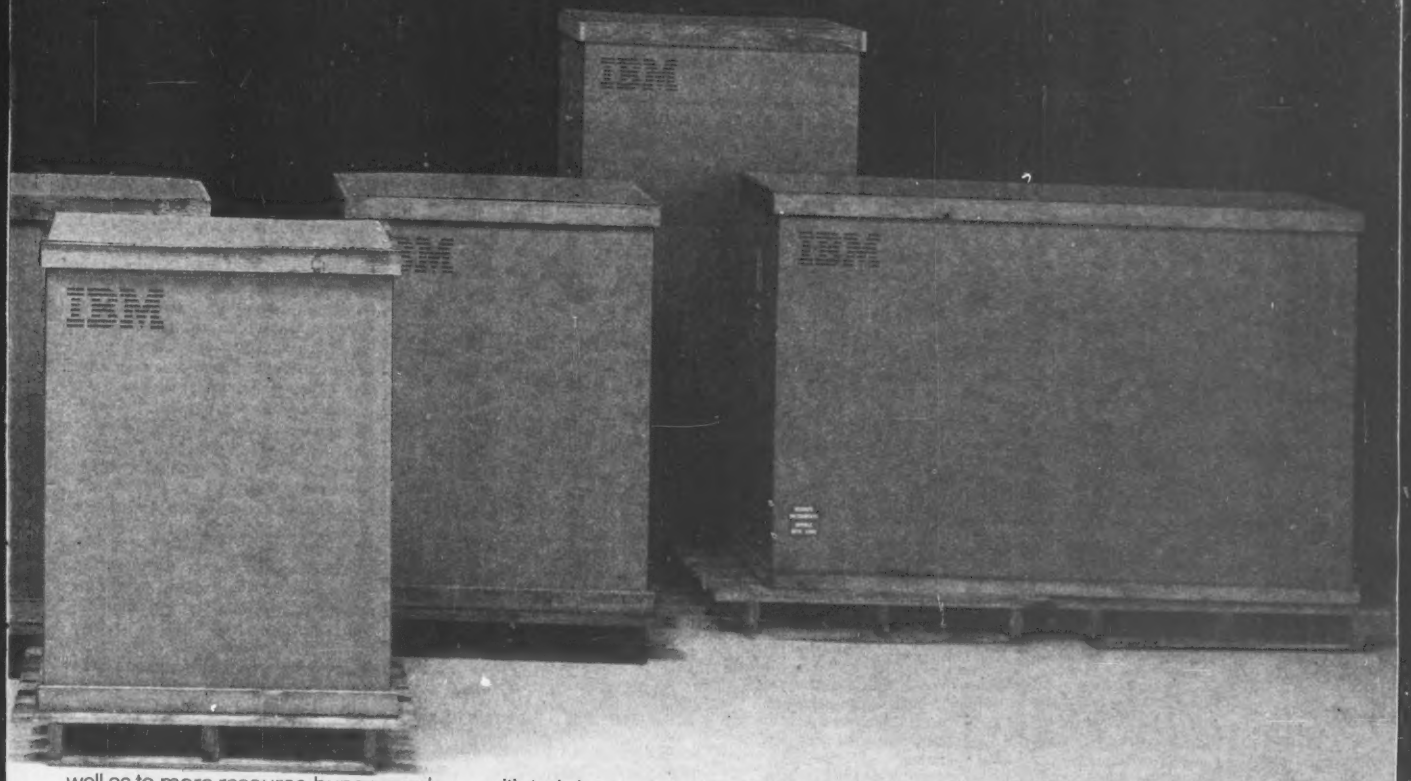


TYPICAL TSO ENVIRONMENT

VAM/SPF is the architectural solution

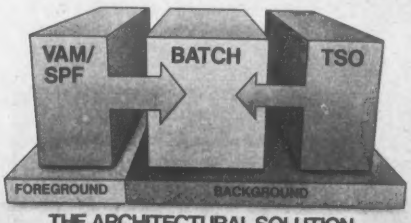
IBM designed SPF to run under TSO, which gives equal attention to both trivial edit-and-submit tasks as

crowd you into bigger CPU



well as to more resource-hungry work. This makes TSO a real resource eater and slows response time for every user of the system.

Boole & Babbage has taken this IBM architecture and turned it into the ideal timesharing system with the classic foreground/background approach. We simply took SPF functions out of TSO and put them under their own communication monitor,



THE ARCHITECTURAL SOLUTION

VAM (VTAM Application Monitor). By forcing the edit-and-submit work to be done under VAM as a classic foreground activity, VAM provides SPF users with truly interactive response time. Background activities such as compiles and on-line testing remain under TSO.

Install VAM/SPF today, start running it tomorrow

VAM requires no programmer retraining because, unlike other programmer productivity tools, there is no other language involved. In fact, VAM is transparent to the SPF user. And VAM is installed using standard SMP procedures.

Get the full story from a VAM/SPF user

VAM is producing bottom-line savings today at data centers across North America. Contact Boole & Babbage for more information and a copy of the Performance Comparison of VAM/SPF vs. TSO/SPF. Just call 800-538-1893 TOLL FREE (in California call 408-735-9550), or write Boole & Babbage, 510 Oakmead Parkway, Sunnyvale, Ca. 94086.

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IN DEPTH

(Continued from In Depth/3)

version have had to be communicated (generally by paper) to other functional areas that need to be aware of that change.

The complexity of data base and its demand for computer understanding have seen the establishment of the data base administrator (DBA) position. It has fallen to the DBA to identify and consolidate the redundant versions of data throughout the organization. Once identified, data is structured by the DBA for implementation and management using DBMS software products.

DBMS products *of themselves* are unable to identify redundant data. Of themselves, they are unable to bring order into the real-life data chaos.

The task has fallen to the DBA to determine which data is significant to different functional areas and to identify and consolidate data in order to reduce data conflicts. Once identified, DBMS products can provide necessary data management that will bring order from chaos. In this way, data base brings about a fundamental change in the organization.

Data base will eventually change the way the organization is managed.

The organization that can be managed effectively is able to work with one set of books, has mainly one copy of data — secure and auditable, but accessible to all authorized users — and can consolidate all of these different uses of data. The information is accurate, up to date and available immediately for management decision-making.

But such data consolidation demands a detailed understanding of the organization, its information requirements through all management levels and its direction for the future.

Abdicated Responsibility

We have placed this responsibility in the hands of the DBA. True, we have not deliberately abdicated management responsibility. But by leaving to the DBA vital decisions that will affect the organization in the future (through the data base designs implemented today), we may have abdicated management responsibility by default.

Management would *never* allocate the responsibility for financial restructuring and reorganization of an enterprise to anyone other than an experienced senior manager with financial and corporate planning experience. *Yet the implications of data base, in time, are just as wide-ranging for the future of the organization.*

Correctly used, data base is a powerful tool that can bring together the many parts of an organization for proper management control. Incorrectly applied, data base offers an opportunity for organizational disaster on a much larger scale than ever possible before.

We *must* involve the end users and management, who have the necessary organizational understanding, in the development of data models that mirror the organization. This can be achieved through the use of information engineering. Only then can we implement data models physically (using either data base or conventional files) without inviting disaster.

Birth of Information Engineering

Information engineering grew out of the early stirrings of data base in the mid-'70s. With the many DBMS products on the market at that time, the evaluation and selection of an appropriate DBMS to meet the needs of an organization was a formidable task.

Given various organizational needs, this evaluation considered the technical characteristics of the DBMS products available, the data base architecture utilized, the characteristics and constraints of each DBMS.

The reports concerning the demise of the System/3 have been greatly exaggerated.

Contrary to popular IBM belief, the System/3 is alive and doing very well for itself at Sorbus.

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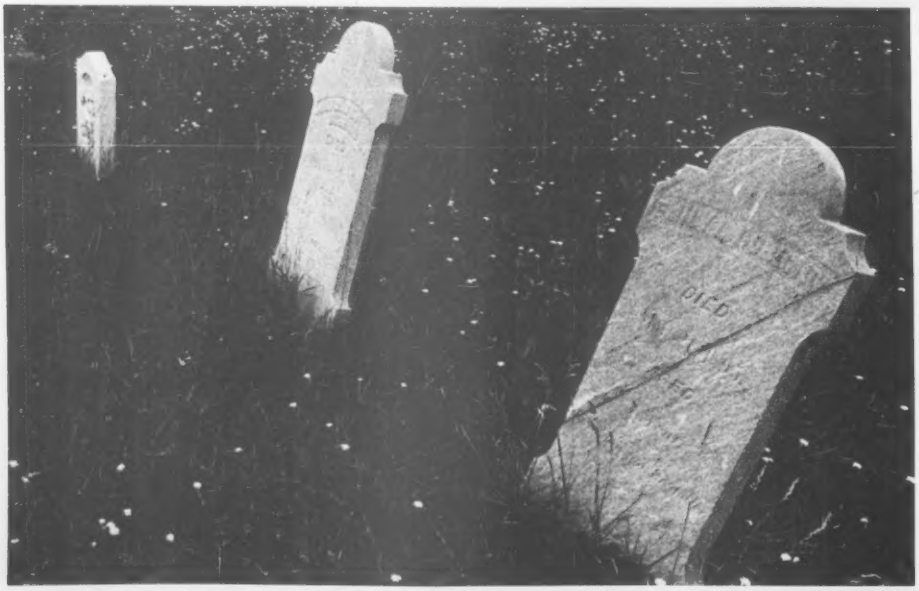

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INFORMATION ENGINEERING — PART 1

IN DEPTH

Only then could the most suitable product to address those needs be selected. But this evaluation and selection again and again was found to be ineffective, *because it assumed the DP department understood what it required of data base.*

It assumed that the organization was aware of the many redundant data subsets that had come into existence over the years. It assumed the future requirements and direction of the organization were established. And it assumed that this direction and data awareness were adequately communicated to the technical personnel charged with the responsibility of selecting an appropriate DBMS product.

The futility in evaluating and selecting data base products without this fundamental organizational understanding was eventually recognized. But the technical complexity of data base and the communication barriers between DP personnel and management appeared insurmountable.

Information engineering was first developed by Infocom Australia, a DP education and consulting company. It resulted from studies in relational theory, normalization and data analysis methodology. We shall explore these roots in some detail.

Data Analysis

The significance of this data analysis methodology soon became apparent. The logical data model so produced was independent of any particular DBMS product or data base architecture. The data model could be physically implemented using any of the DBMS products on the market at that time or instead (for organizations not contemplating data base) could be implemented using conventional files. And, because of its basis in relational theory, the data model could be readily implemented using the long-discussed relational data base products.

The data analysis model not only structured data for physical data base implementation in a way that minimized the impact of future change, but it also optimized that data structure so specific DBMS product features could be chosen to ensure optimum data base performance. It identified those computer transactions that were potentially response-critical (in terms of the processing to be carried out and the users' response time expectation). Such response-critical transactions could be used to optimize the physical data base design prior to detailed application development.

Data analysis was implemented with a data base design method. This provided a formal step-by-step approach for translating the logical data model into a physical data base design, using any of the DBMS products available. This data base design method could also be applied to the physical design of conventional file systems — for those organizations not contemplating the use of data base at that time, or where distributed minis did not support a DBMS.

Data analysis and data base design enabled the DBA to concentrate on the technical aspects of data base design. They gave the systems analyst tools to develop a logical data model optimized to address the users' information needs and response time expectations. They gave the systems analyst a general appreciation of data base design concepts, so he could then readily communicate with the DBA responsible for subsequent physical implementation.

Drawing on Users

However, with experience came true understanding. For in the application of data analysis was found a fundamental requirement for building the logical data model: a detailed understanding of data and its use throughout various functional areas in the organization. *It was not dependent upon a knowledge of computers.* (Once developed, the data model still demanded computer awareness and data base experience for subsequent physical data base implementation.)

Increasingly, it was found that user department management and personnel were being drawn upon to provide that necessary data understanding. And it was found that they were able to learn the data analysis methodology and apply it themselves for developing logical data models. In conjunction with systems analysts, it was possible for business analysts, user personnel and management to apply their fundamental understanding of the organization and its data. The first shot in the information engineering revolution had been fired!

In one example, a large Australian manufacturer trained foremen and clerks from the plant (who had no computer experience) in data analysis. Within nine months, they designed a logical data model that comprised more than 500 entities (record types) and almost 4,000 attributes (data elements). This consolidated the data for more than 40 data bases and application systems!

For perhaps the first time, technical DP personnel and non-DP users and management could work together in the analysis and definition of their requirements for information systems. The communication barriers

(Continued on In Depth/8)

According to James Martin . . .

"Information engineering needs top management involvement in planning the information resources of a corporation. What we're seeing in many corporations today is the data processing department looking *out*.

"If information engineering proceeds from the data processing department outward, it is never going to be as good as if you use a methodology which involves top management in making certain statements about types of information which they feel are necessary to run the company.

"What are now coming into existence are methodologies which enable one to look at information resources, translate those resources into data models, get the data models into a stable form that is independent of technology, translate the data models into today's data bases (which are going to change) and into distributed data bases, to work out the types of distribution you want on networks and *then* to select the tools which will give you the highest productivity in creating the types of information processing which a corporation needs.

"We start by looking at the information needs, translate the information needs into data base structures, make the data base structures as stable as possible, then use high-level languages — much higher level than Cobol — for generating the processing on top of the data base with maximum productivity. That's almost exactly the opposite to the traditional way of doing processing.

"Now one can translate that statement into a set of hard design methodologies for accomplishing it. It is that set of hard design methodologies that I think is going to be the mainstay of MIS five years from now. Much of what will be happening at that time will be the central or coordinated planning of the data structures, but those data structures being used in a highly decentalized fashion — by means of networks, distributed processing, minicomputers, small decision support systems as well as large computers."

— James Martin in an interview with *Computerworld*, Sept. 17, 1980.

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INFORMATION ENGINEERING — PART 1

IN DEPTH

(Continued from In Depth/7)

were starting to fall away. The data analysis data model began to be used as a communications standard between DP personnel and non-DP users and management. The data model documented the data required by the particular functional area. The detail of that data was defined concisely, and it was documented and defined in organizational terms understandable to all.

Data analysis provided an extremely productive technique for analyzing and structuring data identified as significant to specific functional areas. And this presented a problem: *It assumed that the data significant to the area was self-evident.* But data redundancy and organizational complexity, which grow in organizations over the years, defied identification of significant data.

A technique was needed to identify data based upon organizational understanding and direction (before data analysis). This gave birth to functional analysis, which subsequently evolved into information analysis.

Data base design approached the physical implementation of data from the perspective of the computer. Data analysis addressed data relevant to specific functional areas. What was needed was a technique that could identify the different functional area uses of data and consolidate that data in a corporate data model — a technique to identify the information needs of all levels of management. The technique had to identify likely information needs for the future, based on the established corporate strategic direction.

Information analysis provided this needed technique. It approached the identification of data from a basis of corporate planning and management theory.

Information analysis proceeds in three main stages. First, an examination of the corporate purpose and mission identifies data fundamental to the organization now and into the future. Second, the data required by specific functional areas is then identified from an examination of the organization's products, services, markets and channels. Finally, the data required for top management decision-making is identified from an examination of corporate objectives.

Subsequent stages then incorporate current data used by relevant functional areas, with quality tests to identify and resolve conflicts between data required in the past and that needed for the future.

The DP department was unfamiliar at first with the areas of corporate and strategic planning. It was outside the department's scope of responsibility. Corporate management in many instances flatly refused to let DP personnel become privy to sensitive corporate strategic directions.

Not Just DP Tool

And management was right. Information analysis was not just a tool for the DP department. It built upon corporate planning and management theory. It provided a formal methodology that drew upon the corporate directions established by top management to identify data required for effective organizational control.

It clarified the organizational opportunities in a way that had not been done before. The technique could identify reorganization opportunities based upon a consolidation of the data resource throughout the organization. It could be used to direct later, more detailed, information engineering methodologies for detailed design and implementation of responsive decision support systems.

Information analysis was used in a multibillion-dollar government department to achieve "data management control" (and consolidation) of the corporate data resource. And yet another government statutory body used it and "identified tentacles of information throughout the [organization] which we were not aware existed." The group consolidated this in the corporate data model.

Thus the significant breakthrough provided by information analysis was that it was not just user-oriented like some other DP techniques. It forced management to be involved in a straightforward way that used management language and experi-

(Continued on In Depth/13)

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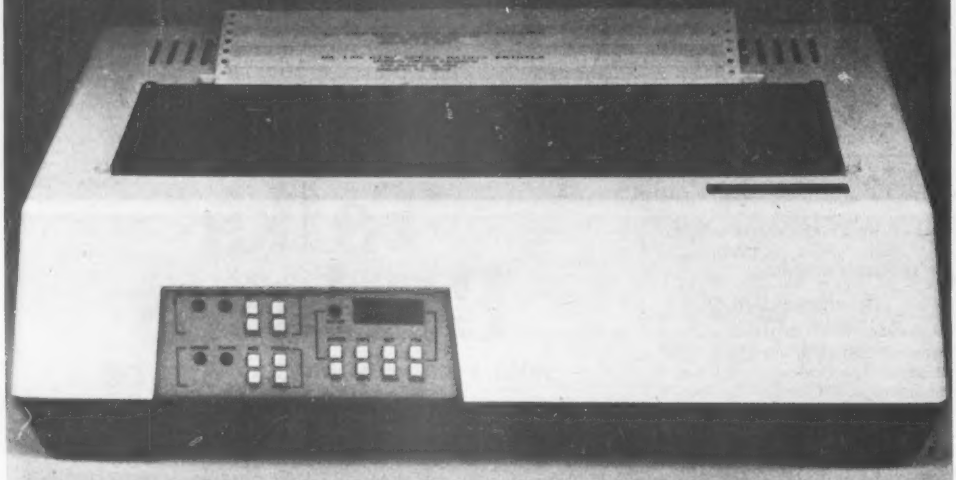

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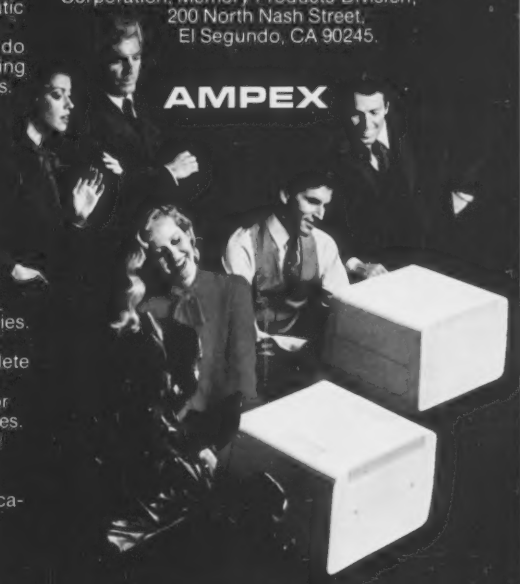

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INFORMATION ENGINEERING — PART 1

IN DEPTH

(Continued from In Depth/8)

ence to drive the design. The result of this involvement was the production of system data specifications that could be used directly by DP. These specifications had the advantage of being self-documenting, and interfaced directly with the existing data analysis methodology.

Data Resource Consolidated

The information engineering methodologies take a fundamentally different approach to analysis and design. Analysis and design methodologies (such as structured analysis and systems analysis) examine the existing procedures in different functional areas of an organization.

The data used by those procedures is then identified and implemented in data files or data bases. However, the ability to consolidate the many redundant versions of data has eluded systems analysis and structured analysis. Those disciplines often attempt to put together the pieces of a data jigsaw puzzle without any awareness of the overall picture.

Information engineering first identifies the data required by different functional areas, then matches that to data required by corporate management. This provides the overall jigsaw picture. Once identified and consolidated, the various subsets of data utilized by different functional areas can be defined. The processing of that data (either manually or by computer-based systems) can then be examined.

Information engineering provides an initial data-oriented analysis and design approach. It is then followed by a procedure-oriented approach. The steps used in information analysis, for example, allow user management to define its own data model and supporting business procedures, with direct meaningful deliverables progressing to the DP people.

Senior Management Involvement

Information analysis provides a tool that enables corporate management to express strategic directions so that the consequences of those directions can be communicated effectively through a corporate data model.

This data model, and its development using information analysis, does not demand that corporate management have prior computer experience. It requires instead that management have a detailed understanding of the organization and its direction based on corporate strategic planning. The model reflects that strategic direction.

The corporate data model is expressed concisely and in terms understandable to management throughout all levels of the organization. It is also understandable to DP personnel. That corporate data model is expressed in the same standard form as produced by data analysis and can be consolidated with data analysis data models.

The resultant consolidated data model now addresses the data resource throughout the organization. It allows information to be extracted for management decision-making by all levels of management. The data model can then be directly translated by technical data base administration personnel into physical data bases or conventional file systems.

The corporate data directions (previously left to the DBA by default) are now able to be established by corporate management.

Corporate and middle management are adopting the information analysis methodology to identify (and structure) data essential to the established corporate direction. As information analysis is used, the realization also grows that it is most effective when based upon the output from formal corporate planning. Two significant realizations grew from experience with information analysis.

In the first instance, information analysis provides a formal methodology for identifying the corporate data resource based upon established corporate strategic statements. However, many organizations have not defined corporate strategic direction in a formal way.

This gave rise to the information engineering corporate planning methodologies of strategic require-

(Continued on In Depth/14)

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IN DEPTH

(Continued from In Depth/13)

ments planning and information requirements planning. These methodologies are based upon corporate planning theory. They establish with corporate management the productivity and profitability potential of various strategic alternatives open to the organization. As a result, not only are the required corporate statements and objectives for information analysis defined, but also functional area priorities are established for initial implementation.

The second realization gave rise to the information engineering methodologies of procedure formation and program specification synthesis.

The data model produced by data analysis addresses the data resource used by current systems within an organization. The data model produced by information analysis consolidates the data resource throughout various functional areas (and eventually throughout the organization) biased toward that data which should be present to support strategic direction and established objectives. This data consolidation often crosses functional or departmental boundaries.

The way in which consolidated data may be utilized (where only one copy of the data may exist) can be quite different from the way in which it is used where redundant versions may have existed throughout the organization. This opens management opportunities for definition of new procedures. Like the data resource, these new procedures may cross functional or departmental boundaries. The organizational benefits offered can be dramatic and can lead to substantial productivity improvement.

The information engineering method called procedure formation grew out of this realization. This considers that the fundamental purpose of processing (whether manual or automated) is to record data changes in the organization. These data changes (addition, deletion or modification of data) are brought about by various decision events.

Identifying fundamental data changes brought about by significant decision events in different functional areas of the organization, procedure formation combines those events in various ways to produce optimum procedures.

These procedures are assumed to operate against a logical version of the data resource. The organizational and productivity opportunities this opens up can be dramatic. Furthermore, these procedures can be implemented on a manual basis, by computer or both — either distributed or centralized.

In one example of its use, procedure formation enabled a large Australian organization to identify new procedures for decentralized operations control of what had been an "economy-of-scale" batch approach. This was possible because of the data distribution achieved through the use of information analysis.

The consolidation of the corporate data resource by information analysis, and the determination of new procedures through procedure formation, suggest to management possible reorganization opportunities. New organizational structures can be defined, which can derive optimum benefit from access to the consolidated corporate data resource. (The Australian organization mentioned above, for example, subsequently centralized its control procedures from its previous decentralized control structure.)

Program Specification Synthesis

But the most productive benefit of procedure formation is its extension into program specification synthesis. The identification of decision events which bring about data change — used for procedure formation — presents a completely new approach to the development of program logic. It results in the synthesis of program specifications through a formal method that does not demand extensive programming or analysis experience.

The logic defined by procedure formation can be extended by clerks with no computer experience directly into formal Structured English procedure specifications for translation by coders or programmers into

(Continued on In Depth/18)

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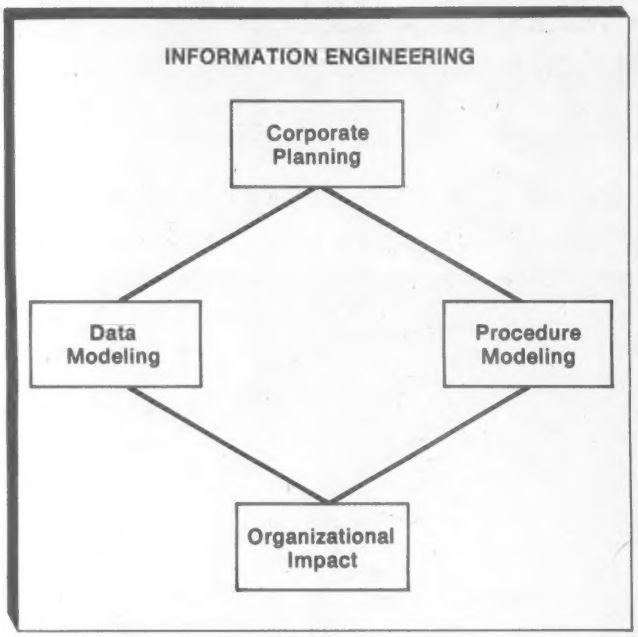

Figure 1

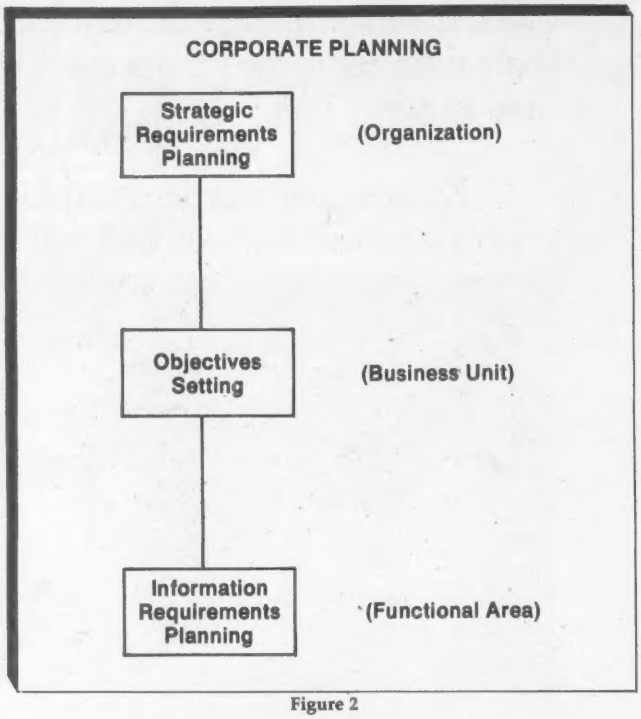

Figure 2

(Continued from In Depth/14)

appropriate source program statements. Or it can be applied by programmers for direct specification of source program logic from the output of procedure formation.

The result is the synthesis of program logic that automatically exhibits high functional cohesiveness (the objective of structured design). Dramatic application development and maintenance productivity improvements are possible. It does not yet permit the complete, automated synthesis of programs (hence the name "program *specification* synthesis"), but is evolving toward that goal. It offers enormous potential for the future.

The previous discussion addressed the evolution of information engineering through research, education and practical application. The remainder of this article places the various methodologies in context and outlines approaches for introduction of information engineering into an organization.

Information engineering comprises an integrated set of methodologies:

- Strategic requirements planning.
- Information requirements planning.
- Information analysis.
- Procedure formation.
- Data analysis.
- Data base design.
- Program specification synthesis.
- Security and audit.
- Distributed analysis.
- Information engineering planning and management.

Each of these methodologies was designed to be applied on its own, using as input existing documentation in the functional area being examined. Each methodology draws on the experience of operating department users, together with operating management and top management.

When all techniques are used together directly as part of an integrated set of methodologies, however, the output from one methodology is used directly as part of the input for subsequent methodologies. The end result of information engineering is the design of stable information systems that are better able to accommodate business change with less reprogramming than those produced using traditional or structured techniques or through business systems planning.

Information engineering interfaces with these techniques where they are already in use in an organization. It dramatically improves the quality of systems developed. These information systems may be implemented with conventional files, any of today's DBMS products or the emerging relational data base products. They may use micros, minis or large computers (distributed or centralized) and an appropriate combination of packages, end-user languages or programmed systems — cross-checked against the data models and business procedures determined for the organization.

Figure 1 illustrates the four major components of information engineering: corporate planning, data modeling, procedure modeling and organizational impact. These components are illustrated in Figures 2 through 4.

Corporate Planning

Strategic requirements planning establishes with senior management the strategic direction (and objectives) of the organization for the future, based upon effective use of computer-based information systems and on decision support systems.

Information requirements planning helps establish (or review) the corporate strategic statements with top management so that these can subsequently be used as input to information analysis. Measurements of the expectations that might apply to an information analysis project are presented. These suggest the potential impact upon the organization. They outline the potential for reorganization to better achieve corporate strategies and objectives through effective use of information.

Data Modeling

Information analysis provides a method that can directly involve management and business analysts without DP experience. It enables them to translate their organizational knowledge and information requirements into information systems based directly on corporate objectives and strategies. It identifies the data resource of an organization (or instead a single functional area) based upon the corporate strategic direction established for that organi-

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zation or area. The analysis enables an integrated corporate data model to be developed which consolidates data throughout the organization based on its requirements for the future. It provides comprehensive input to data base/file design, procedure modeling and distributed analysis.

Data analysis is a method for developing a data model by examining existing systems and data in separate functional areas of the organization. A logical data structure is produced — optimized for response-critical transactions, based on the users' response time constraints. It provides input to conventional file design or data base design and is particularly useful in conversion of current systems to data base technology.

Data base design addresses the problems associated with both conventional file design and data base design. The logical model of the required data (produced by information analysis and/or data analysis) is used as input. The method can be applied to conventional file systems, to data base systems that use any of the current DBMS products or to systems that use the emerging relational data base packages.

Procedure Modeling

Procedure formation provides a method for use by top management and business analysts that enables new procedures (based upon data consolidated from information analysis or data analysis) to be designed. Procedure formation identifies business opportunities resulting from use of an integrated corporate data model. It builds those procedures from an examination of events that bring about data change in the data model and identifies the controls that must be observed.

It also leads to development of new procedures for manual systems or to program specification synthesis for computer-based systems. Procedure formation also allows for the data model produced in information analysis to be quality tested as to its ability to support management decisions.

Both procedure formation and information analysis are objectives-driven. They provide powerful techniques that bridge directly from corporate objectives and strategic directions to information systems and decision support systems.

Program specification synthesis is a methodology for formal derivation of program logic directly from a data model (produced either by information analysis or by data analysis). It implements (as program specifications) the procedure logic defined by procedure formation. The derived program logic can be expressed either in Structured English or directly in structured, source program statements. The resultant programs automatically exhibit high functional cohesiveness — the final objective of structured design.

Procedure modeling (using procedure formation) may interface with structured analysis and, with program specification synthesis, results

(Continued on In Depth/22)

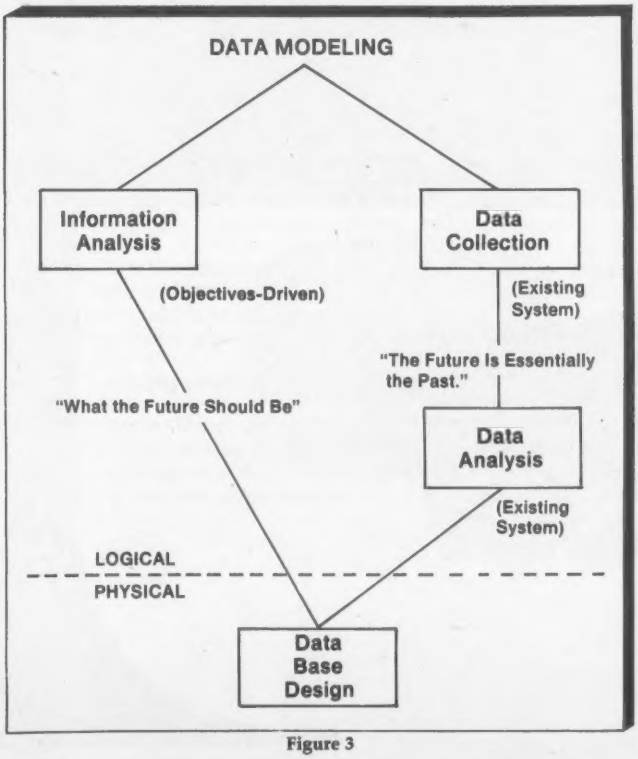

Figure 3

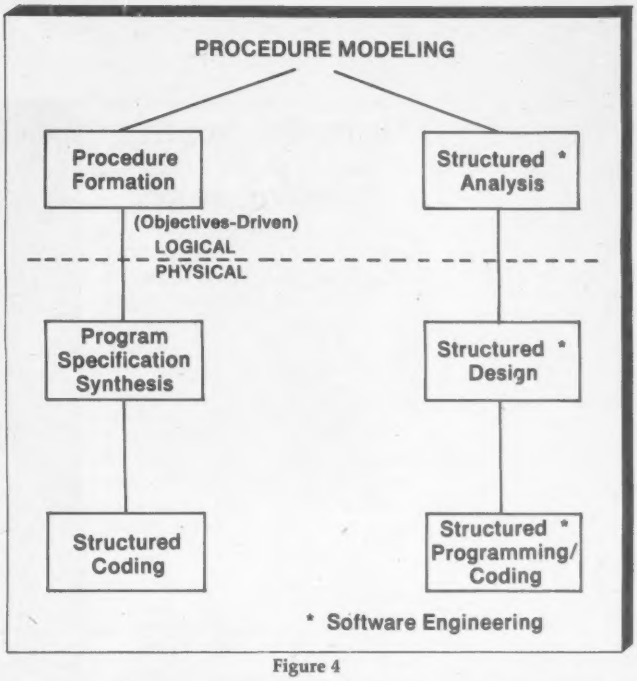

Figure 4

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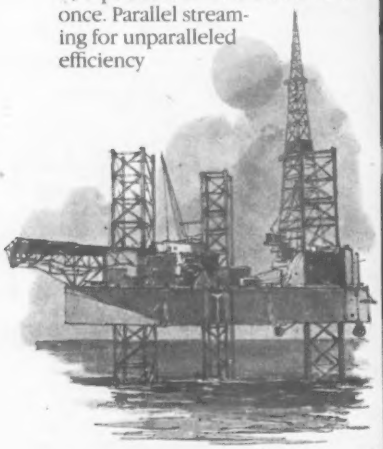

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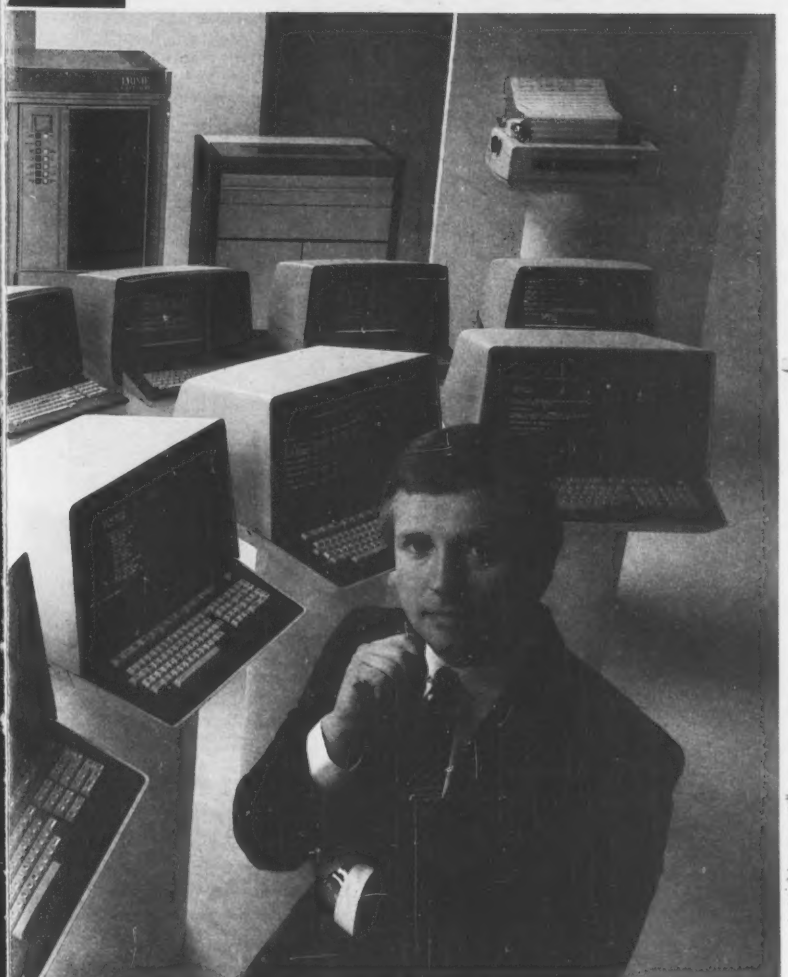

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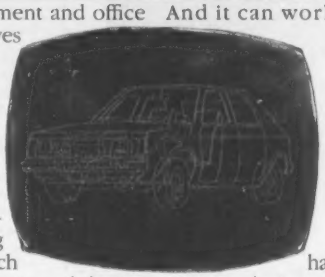

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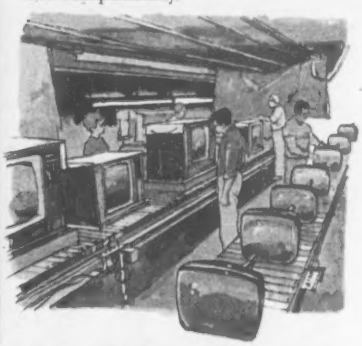

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(Continued from In Depth/19)

in the formal development of structured code. It presents a formal, repeatable alternative to the intuition and experience essential to structured design.

Implementation Alternatives

Within organizational impact (Figure 1) are a number of methodologies that reflect the greater organizational understanding resulting from the methodologies discussed above. These consider implementation alternatives.

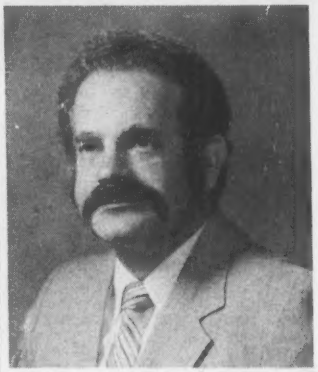
Security and audit address the audit requirements of computer-based information systems, whether centralized or distributed and whether using conventional files or data base. Specific information engineering techniques that permit active, participative security and audit control are utilized — based in particular on information analysis, data analysis, procedure formation and program specification synthesis.

Distributed analysis is a practical method for identifying the implementation alternatives of distributing data and processing between several interconnected systems in a centralized environment or between several geographically distributed systems.

Information engineering planning and management provides a methodology for planning and managing all aspects of an information engineering project.

Checklists of the various activities, their outputs and preferred sequence are provided together with guidance on how the methods interrelate. To validate results, defined quality tests are used at various points.

Next week: Developing a corporate model through information engineering.



Clive Finkelstein has spent 20 years in DP, 15 of which were with IBM in the U.S. and Australia. He founded Infocom Australia in 1976.

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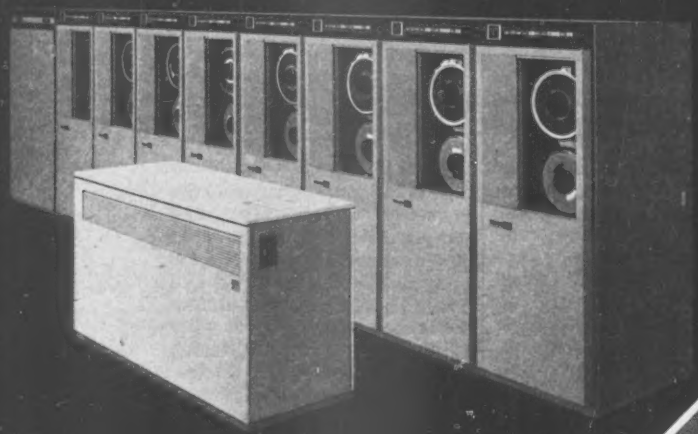

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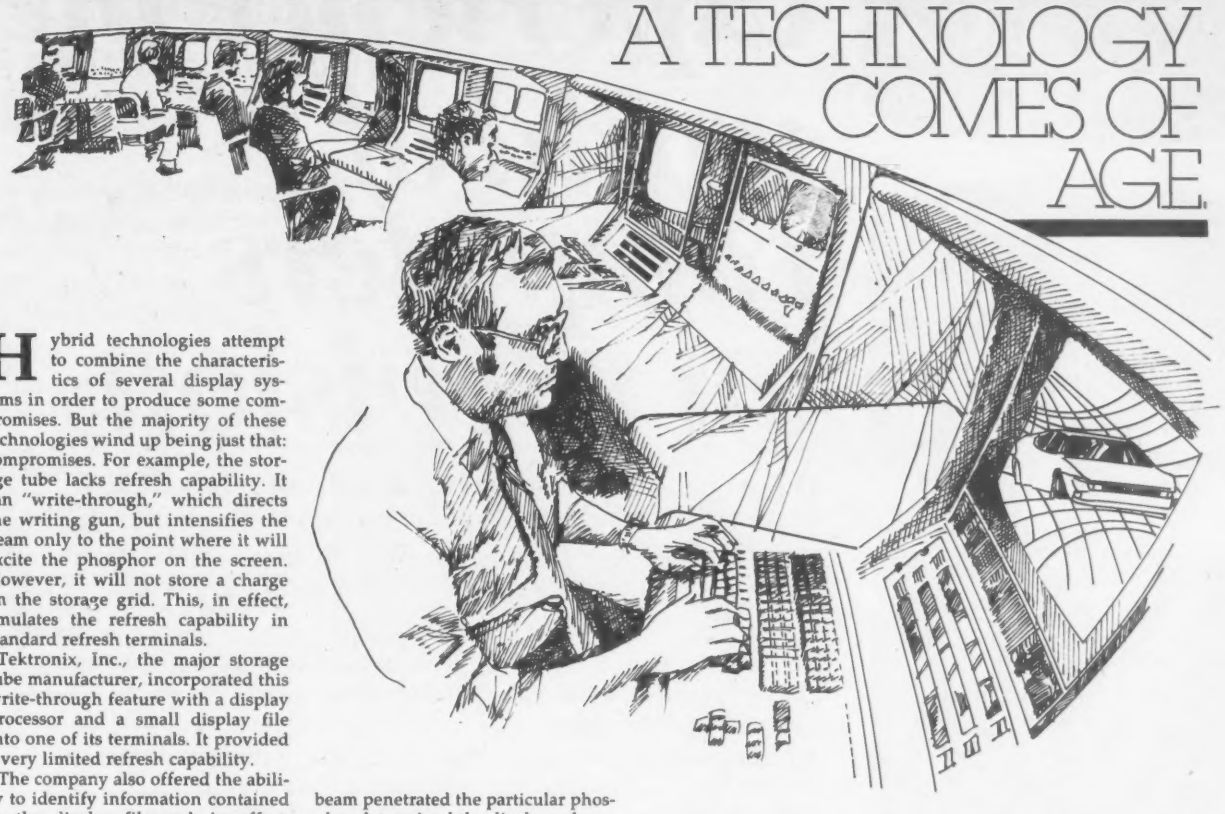


Hybrid technologies attempt to combine the characteristics of several display systems in order to produce some compromises. But the majority of these technologies wind up being just that: compromises. For example, the storage tube lacks refresh capability. It can "write-through," which directs the writing gun, but intensifies the beam only to the point where it will excite the phosphor on the screen. However, it will not store a charge on the storage grid. This, in effect, emulates the refresh capability in standard refresh terminals.

Tektronix, Inc., the major storage tube manufacturer, incorporated this write-through feature with a display processor and a small display file into one of its terminals. It provided a very limited refresh capability.

The company also offered the ability to identify information contained in the display file and, in effect, "post" it from the display file onto the storage grid. This meant that anything not stored in the display file could be moved around as in a regular refresh graphics system. It could also be posted to a particular place on the screen and then refreshed from the storage grid. The display file could then be rewritten with fresh information.

Unfortunately, there are two basic problems with this compromise. First, the size of the display file was so small that only a very limited number of vectors could be stored in it. The second — and major — disadvantage is that the picture displayed in refresh mode is considerably dimmer, so the picture written in this mode is very difficult to see.

This is Part 2 of a two-part article on computer graphics.

Advent of Color

Another compromise developed when refresh graphics realized that it needed color capability. The "beam penetration CRT" was developed, in which different colored phosphors were layered on the inside face of the screen. The degree to which the beam penetrated the particular phosphor determined the display color.

This technique produced a very limited range of colors, such as red, orange, yellow and green.

In order to reduce the amount of flicker in the beam penetration technique, it was necessary to paint all the elements of one color consecutively — that is, all the red elements, then all the yellow elements, all the green elements and so on. This significantly complicated the structure of the display file.

Input Devices

So far this article has dealt only with output devices, that is, with the flow going from the application program to the display device. Similar problems exist for input devices. Many input devices are available, each of which may be very useful in some specific applications but totally useless in others. Figure 1 (on In Depth/26) is a partial list of commonly used input devices.

Other input devices, such as scanners or voice input, are much less common. In addition, there are some fairly exotic three-dimensional input devices intended for very special purposes and beyond the scope of this article.

The graphics input device may be the most important aspect of the system. While a large body of literature describes the devices' relative degrees of efficiency, the choice for a given function often depends on personal preference.

Graphics input devices have three basic functions: pointing, positioning and drawing (sometimes considered part of the pointing function). Although most devices perform all three functions, some do so only under great duress.

The usefulness of a particular input device is also highly dependent on the shape of the cursor it manipulates on the screen. (It would be nice if the user could select the shape or style of the cursor based on the application, much in the same manner as selecting a camera's focusing screen.)

Cursors. Cursors come in a variety of configurations, but one of the most useful for graphics work is the *crosshair*, which consists of a horizontal line crossing the screen from edge to edge and a vertical line crossing from top to bottom. This configuration facilitates the horizontal and vertical alignment of graphics elements and is especially useful for input devices that combine horizontal and vertical motion.

Thumb wheels. Figure 2 (on In Depth/26) shows a display that uses thumb wheels to manipulate the crosshairs on a screen. The horizontal crosshair is moved by rotating the parallel thumb wheel, whereas the vertical is moved up and down by rotating the other one.

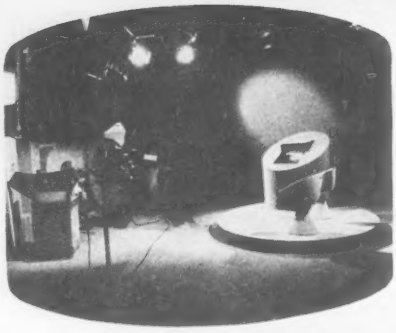
The relationship between the thumb wheel rotation and the crosshair is very direct, and the crosshair can be positioned both quickly and precisely. Because horizontal and vertical positioning are done separately, thumb wheels are particularly useful when generating images containing horizontal and vertical lines and those in which the picture elements must be horizontally and vertically aligned.

Light pens. The light pen is a relatively blunt instrument when compared with most other interactive input devices. It was the first pointing device to be used with graphics systems and operates by sensing light on the face of the screen, then generating an interrupt. It is most commonly used with refresh graphics systems.

Displayed entities are detected, not by their location on the screen, but rather by the instruction that is being executed in the display file when the light pen interrupt is received. When the structure of the display file is known, the identity of the element

(Continued on In Depth/26)

by Timothy K. Dudley



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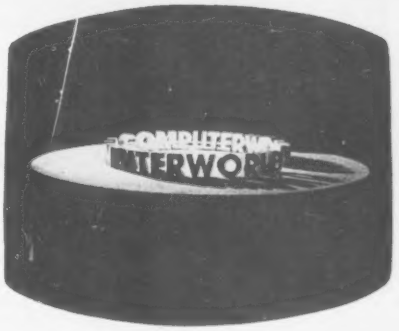

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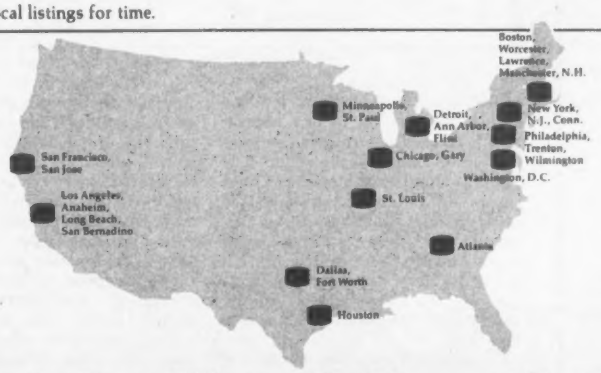

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Figure 1

(Continued from In Depth/23)

being drawn at the time of the interrupt can be determined.

Light pens have many disadvantages and only two advantages. One advantage is they are historically interesting, in that they were the first interactive pointing devices used with graphics systems. The other advantage is that they are very impressive on first sight, giving an aura of mystery and snappy presentation.

Barrage of Negatives

The disadvantages are almost too numerous to list. Light pens are awkward to use. The parallax problem, created by the gap between the phosphor and the glass covering the screen, makes it very difficult to accurately position a cursor. Blank positions on a screen cannot be detected because light pens detect light, and therefore a light source (tracking cross) is needed in order to generate interrupts. They are awkward and tiring to use and hold for more than three or four minutes at a time.

Cursor pads. The cursor pad is another relatively useless graphics input device. The cursor pad generally consists of five keys, one each for up, down, right and left, and a fifth that returns the cursor to a predefined home position. It is repositioned by pressing the key corresponding to the desired direction. It will then move in the desired direction a prespecified number of units. The cursor pad is straightforward to implement and very inexpensive.

Touch-sensitive panels. These, too, are not widely used. The touch-sensitive panel is particularly well suited to applications that require identifying areas, as opposed to specific points, on the screen.

It is produced with the variety of technologies, but the most common consists of sets of horizontal and vertical wires, each mounted in a thin plastic sheet, then combined into a grid separated by a third clear plastic sheet. The wires may be separated one-half inch to an inch, depending on the resolution desired for the panel. The panel is then mounted on the face of the screen and when a spot on the panel is touched, the grid intersection nearest that spot is detected and decoded.

The advantage of this type of device is that it is very direct. The user actually touches the section of the screen he wishes to identify. This is useful in systems utilizing menu selection or in computer-aided learning systems for young children, in which the child identifies the required response to a question by touching the answer.

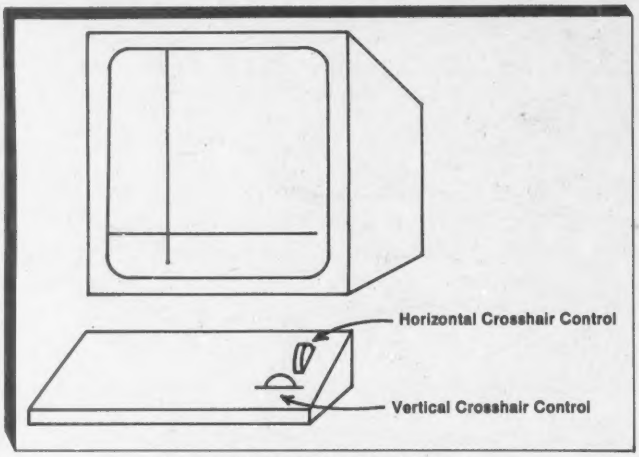


Figure 2. Display With Thumb Wheels

The main disadvantage of touch panels is their lack of resolution. They can only be used to identify areas, not specific points, on the screen. However, they are excellent input devices for applications in which this lack of resolution is not a constraint.

The mouse. This device consists of a small box on which a set of buttons and two wheels with orthogonal axes are mounted. The relative movement of the mouse is determined by measuring the rotation of the wheels, which in turn determines the location of the cursor on the screen. The buttons on the top generate interrupts and can be programmed to cause certain functions to be performed when they are pressed, such as moving the beam to the current cursor position, drawing to it, placing an entity at the current location and so on. The mouse is shown in Figure 3.

The mouse is very easy to use and can be operated on any flat surface. People using it for the first time anticipate difficulty in coordinating cursor movement with the mouse while watching the results on the screen. However, this difficulty disappears within two to three minutes of use.

There are two primary disadvantages with the mouse. One is that the wheels tend to slip when the device is moved at a 45-degree angle to the directions of the axes. This reduces the directness of the relationship between the mouse movement and the corresponding cursor movement.

The other disadvantage is that unless the mouse is held such that the wheels correspond exactly to the horizontal and vertical orientation on the screen, the movement of the mouse will not correspond exactly to the movement of the cursor. For example, if the mouse is rotated 180 degrees, subsequent movements away from the user will cause the cursor on the screen to move down and, correspondingly, a movement from left to right will cause the cursor to move from right to left.

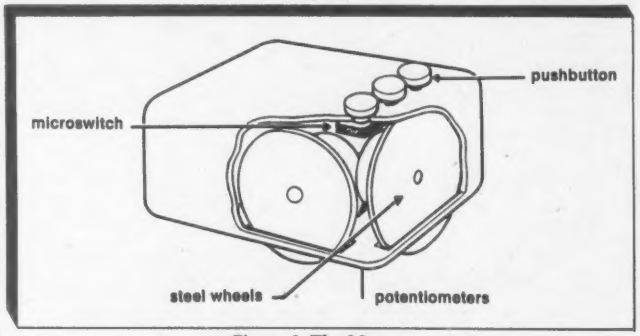
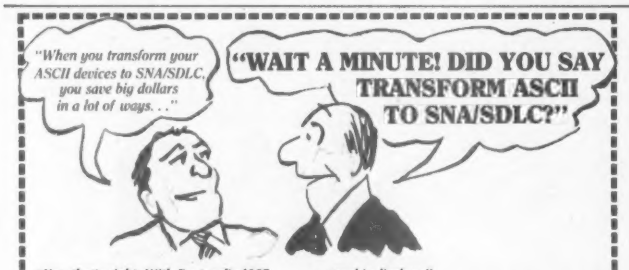


Figure 3. The Mouse

The digitizing tablet. This device is used in conjunction with a stylus or another version of the mouse and consists of a small surface (typically 10- to 11 in. to a side) underlayed by a fine grid of wires typically .001 in. apart. When the stylus or the other version of the mouse is placed on this surface and the interrupt button is pressed, the grid location is read and transmitted back to the graphics

(Continued on In Depth/28)



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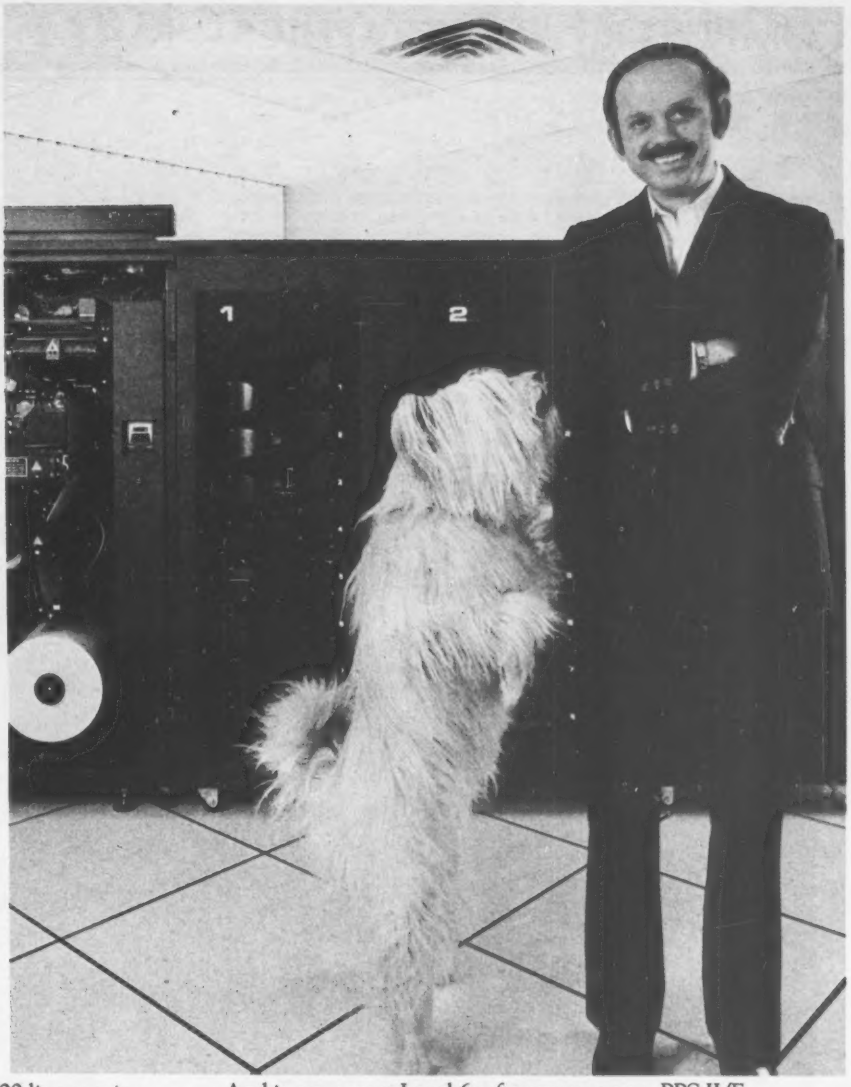

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IN DEPTH

(Continued from In Depth/26)

device.

This medium's similarity to pencil and paper makes it very natural for a variety of applications. It is a particularly good device for freehand sketching or for entering nonmathematical information into a computer, as well as being an excellent device for menu selection.

One of the most common applications of the digitizing tablet and stylus is to have an overlay containing menu items which is placed over the sensitive part of the tablet. The menu items are selected merely by placing the stylus over the desired menu item and pressing the interrupt button.

Again, one of the disadvantages of the tablet is the problem of hand-to-eye coordination, but this disappears as soon as the user becomes familiar with the device.

The digitizing table. Essentially a large version (36 in. by 48 in.) of the digitizing tablet, this device has a sensitive work surface. It is primarily used for digitizing maps or printed circuit board layouts or schematics, for rendering mechanical drawings or for any information currently contained in a large drawing and which needs to be entered into a computer system.

Figure 4 shows a combination of a digitizing table, digitizing tablet and stylus. This is a fairly common configuration in large computer-aided design systems, particularly in ones that are menu-driven. The information to be digitized is placed on the digitizing table, and the menus that enable selecting the different functions, operations and graphics elements available are placed on the tablet.

The track ball. Sometimes called a tracker ball or a tracking ball, this is another very effective input device, particularly well suited to three-dimensional applications. Shown in Figure 5, it consists of a small ball, typically 2- to 3.5 in. in diameter, mounted in a box, with interrupt buttons mounted on top of the box next to the ball. The track ball provides a very direct method of manipulating graphics information.

In particular, if the application calls for the manipulation of three-dimensional images, track balls offer the most direct visual feedback of any input device.

One of the problems associated with the track ball is the difficulty in drawing horizontal and vertical lines. It also suffers a certain amount from slippage, much like the mouse.

Control dials. This type of input device is not commonly used. Control dials are essentially programmable potentiometers. They are typically mounted in a box with anywhere from four to 16 dials, each of which is selectable and programmable.

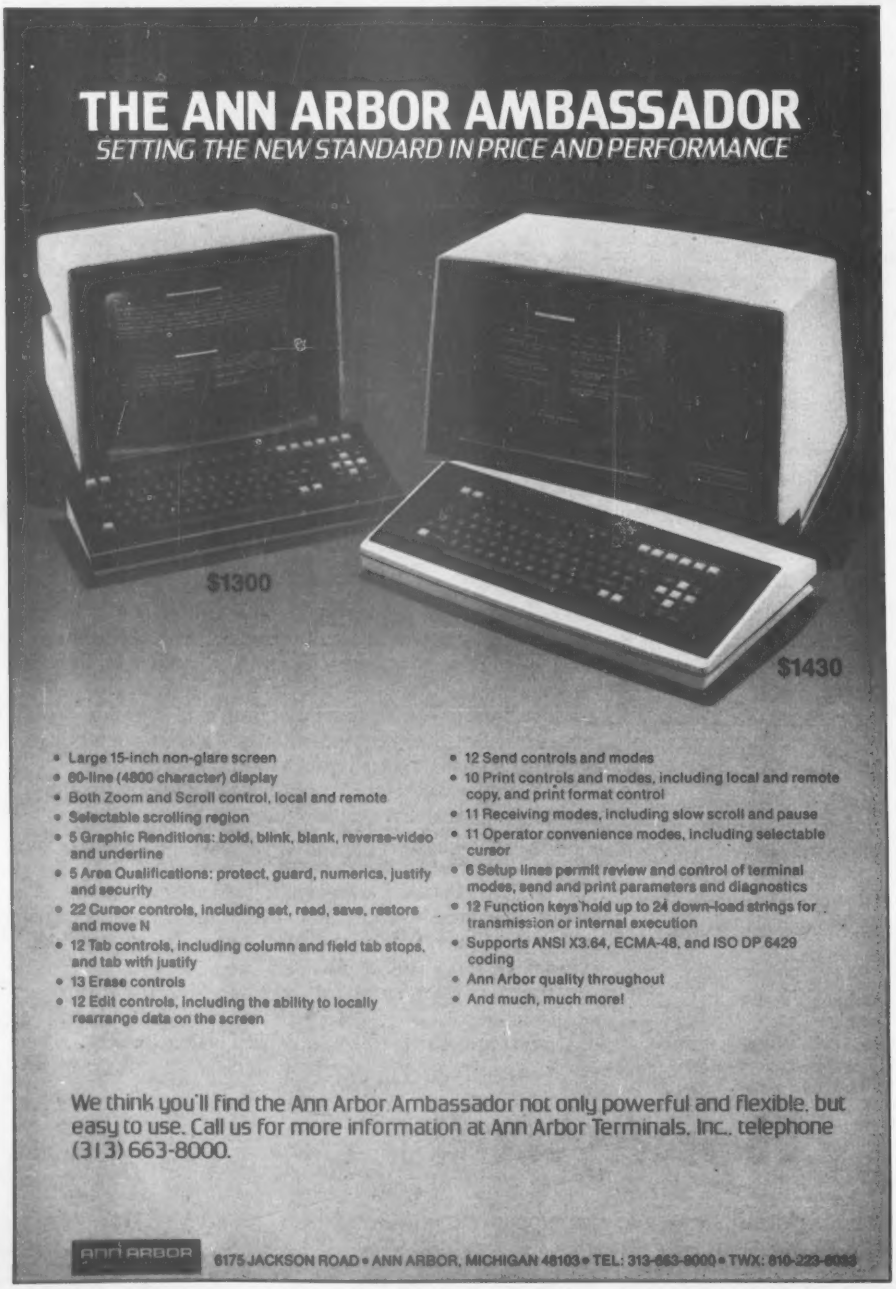
Control dials generally do not manipulate cursors; rather, they manipulate an image on the screen. They are typically for operations such as panning (moving the existing picture left to right or up and down) or zooming (either enlarging or decreasing the size of the picture). A version of control dials can change colors or select a color pallet.

Function keys. These are sometimes, though not always, considered input devices. Function keys are merely special keys for executing certain procedures. A typical application is a key associated with a particular graphics entity. The entity can be preprogrammed, then called up very quickly at various locations on the screen by simply striking the key.

Capturing Data

We know how data should be manipulated in order to produce effective graphics. However, the major problem is getting a large amount of information into the machine to start with. This is particularly significant in cases where a data base of graphics information already exists on paper and a newly installed computer system must capture all the paper-based information.

Existing drawings are captured primarily by replicating them on a digitizing table. However, some applications use scanners, input devices that optically scan drawings in an attempt to digitize the information based on the amount of light reflected. There are significant problems with these devices, not the least of



IN DEPTH

which is translating raster format information into vector format information, then attempting to identify graphics entities.

Hard-Copy Output

Output devices do not necessarily need to be CRTs or interactive display devices. However, images displayed must be translated from world coordinate systems into some device-dependent coordinate system, determined by the hard-copy output device being used. Graphics hard-copy devices may be generally categorized as printers, plotters, film recorders and "other."

Standard line printers may be used to display limited graphics by placing alphanumeric characters at strategic places on the page and also by superimposing alphanumeric characters in order to obtain a halftone effect. Pictures generated in this manner are generally not particularly effective, and advances in other graphics hard-copy technology have made this practice outmoded.

'Technical breakthroughs with tremendous impact will likely be made in the next six to 18 months. New applications will occur because of a friendlier environment and increased understanding. The public's acceptance will result mainly from computer animation, as in the Levi's and Wang television commercials and in movies such as "Star Wars" and "The Empire Strikes Back."'

Dot matrix printers can also be used to generate pictures. The quality of the picture produced on a dot matrix printer-plotter is dependent on the resolution of the plotter, with a common resolution of approximately 200 lines per inch producing visually effective pictures.

Plotters can be categorized as pen, dot matrix or ink jet. Pen plotters can be subdivided into drum and flat-bed plotters.

Drum plotters are generally of two types. In the first, a continuous roll of paper is fed over a drum, which rotates back and forth in order to produce motion in one direction. The pen carriage is mounted horizontally across the drum, allowing the pen to travel back and forth in the other direction. The combined pen carriage and drum movement produces vectors in any desired direction. The pen carriage can often accommodate more than one pen, each of which is program-selectable, giving the capability to plot line drawings with different colors.

The other type of drum plotter differs only in that a single sheet of paper is taped to the drum, as opposed to its being fed a continuous roll of paper. Paper width for drum plotters generally tends to be between 24 and 36 in.

Flat-bed plotters are generally more precise than the drum plotters and also are generally larger, although recent technology has produced desktop flat-bed models. Prices on drum plotters range from $4,000 to $25,000, with the most common price range being $10,000 to $15,000. Large flat-bed plotters are much more expensive because of the requirements for increased precision and range from around $120,000 to $200,000.

The basic difference between pen plotters and dot matrix plotters is that the pen plotter is a vector-oriented device, and the dot matrix plotter is raster-oriented. When using a dot matrix plotter for line drawings, a vector drawing must be converted to a raster format before it can be plotted.

One of the claims for dot matrix plotters over pen plotters is that it takes a constant amount of time — one to three minutes — to plot an entire picture, regardless of its contents. But this is an extremely misleading claim, since it does not take into account the fact that this rasterization process must take place before the plot can be produced.

Ink-jet plotters are primarily used for color applications. They are capable of producing very large plots containing an almost infinite variety of colors. They operate similarly to drum plotters except that instead of a pen carriage, there is a carriage that contains three different-colored ink jets. The jets move in front of a rotating drum on a worm gear. The amount of ink, as well as its color and intensity, is determined by computer-generated codes.

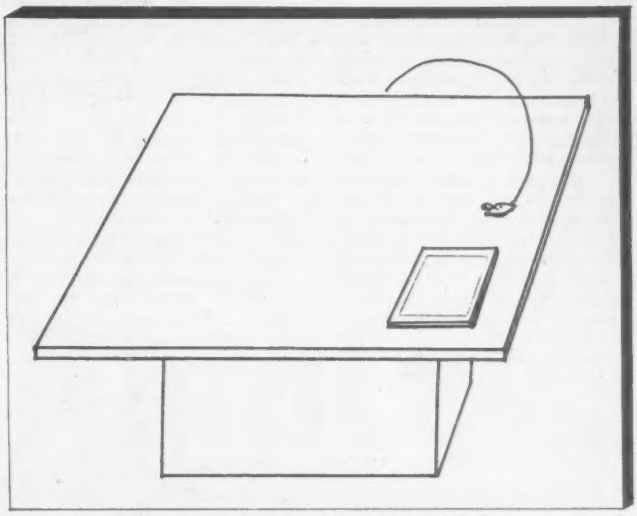


Figure 4. Digitizing Table, Tablet and Stylus

Very large, very precise images in a wide variety of colors can be produced with this technology. It is well suited to applications such as image

(Continued on In Depth / 30)

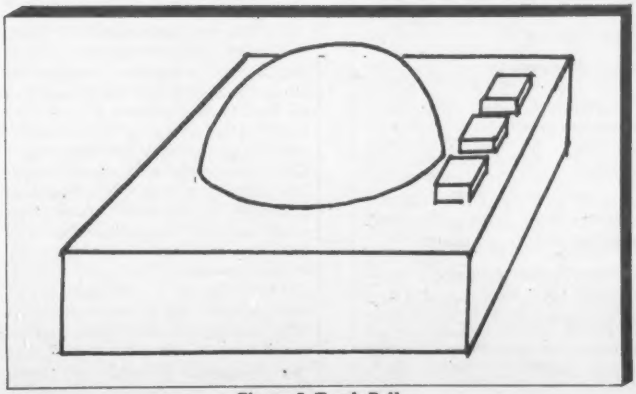


Figure 5. Track Ball

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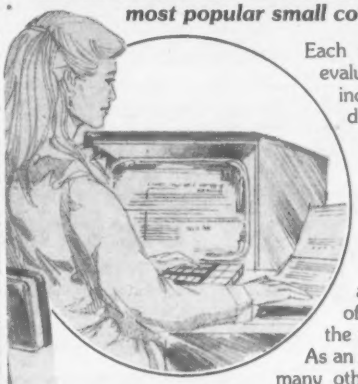

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(Continued from In Depth/29)

analysis. These plotters tend to be fairly expensive, ranging from $50,000 to $75,000, although a smaller model, recently introduced, sells in the neighborhood of $6,000.

Film recorders. The photoplotter is probably the best known in this category. It is used to produce extremely precise drawings for such applications as printed circuit board and integrated circuit mask artwork. Photoplotters are very precise, very stable and very expensive. They are special-purpose plotters, specifically designed for extremely high-precision plotting.

Other film recorders are used primarily to produce color hard copy from raster graphics terminals. They produce 8- by 10-in. prints, color slides and, in some cases, videotape. This area is experiencing furious activity because of the need for business graphics applications for management information systems and financial information systems.

In the category of "other," Xerox Corp. has produced an interface for its color copier that allows it to be utilized as a hard-copy device for color graphics terminals. In addition, Tektronix manufactures a hard-copy device that produces 8- by 10-in. prints. The picture is scanned directly from the face of the storage tube and is transferred to a heat-sensitive paper, which is then developed to produce the image on the paper.

Graphics Software

It is difficult to know how to distinguish graphics software characteristics. It has progressed through the same stages as software for any computing system: from very low-level, device-dependent assembly languages to so-called "graphics languages" and on to extensions to existing languages in the form of subroutine or procedure packages. Finally, it has reached the stage of graphics packages that enable users to define pictures easily by specifying sets of parameters rather than by actual programming.

The software problem was compounded by the basic differences in graphics display technologies, particularly between the storage tube display and the refresh display. Researchers found that they were programming for specific devices and, as a result, there was a lot of reinventing going on.

Initially, a graphics device required some sort of graphics software package to drive it which also provided an application program interface. Unfortunately, these interfaces varied, depending on the individual devices, so applications had to be rewritten each time a new device or new feature became available.

The situation was not eased by competition among graphics equipment manufacturers, each of whom was trying to offer features not available from the competition. Eventually, this led to some very primitive attempts to standardize the software.

At one time, California Computer Products, Inc. had a large number of plotters installed and had produced and marketed a software package to drive them, a set of Fortran-callable subroutines that did moves and draws, set scaling parameters, drew horizontal and vertical axes and so forth. For some time there was strong movement afoot to encourage the graphics user community to be Calcomp-compatible. Because of the company's large customer base and the quality of the software package, it became a de facto standard for hard-copy graphics. However, it was not suitable for interactive work.

Later, around 1973, Tektronix produced and marketed the Plot-10 graphics software package which was designed to allow Fortran programs to produce pictures on the Tektronix storage tubes. This set of subroutines provided a high-level language, interactive graphics capability and eventually replaced the Calcomp package as a widely accepted standard in North America.

Other packages also became available at about the same time, and interest in graphics languages and standardization or device independence began to increase significantly. The search for a universal graphics language was on.

Groping for Standards

The International Federation for Information Processing (Ifip) Working Conference on Graphics Languages, held in Vancouver, Canada, in 1972, was one of the first attempts to identify the common elements in then existing graphics "languages" and packages. It hoped to define the basis for a common graphics language. While that did not occur, a tremendous body of information was exchanged concerning the problems associated with the computer processing of pictures.

In 1974, the Association for Computing Machinery's Special Interest Group on Graphics (SigGraph) formed a group known as the Graphics Standards Planning Committee, whose stated objective was to "establish the groundrules for future standards" for graphics software systems. The committee was not particularly successful in this effort until 1976, when another Ifip workshop was held on graphics methodology in Seillac, France.

The workshop "... identified the need to study the structure of application programs in order to understand how to design software systems to support them. It also made clear the advantages of separating

The Market For Computer Graphics

Observers generally agree that computer graphics is poised on the edge of remarkable growth. The only disagreements concern how good the market will be.

Several reports have recently appeared, but it's difficult to compare them because of semantic differences. Some refer to the graphics business, but really mean the CAD/CAM industry. Others are concerned only with the growth of the business systems market. One quotes growth in dollar revenues; another in number of terminals installed.

However, the same tone pervades all reports: The graphics industry is booming. Thomas Henwood, in a First Boston Corp. report, said industry growth will average nearly 40% annually throughout the '80s.

The report pegged current market penetration at less than 5% and predicted an $8.3 billion market by 1990.

Another report by Venture Development Corp., quoted in *Business Week* (June 16, 1980), said 210,000 graphics terminals will be in use by 1983, compared with 12,000 in 1978. Reliable sources place existing orders for IBM's 3270 terminal at between 50,000 and 100,000 units. Venture Development's report also predicted that half the terminals shipped in 1983 will be for business applications, compared with one in 10 today.

This is consistent with a report by Oratech, a Canadian firm, which said business graphics will account for 42% of the market by 1985.

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the essential picture-generating functions (the "core") from other functions such as modeling functions, likely to be application specific" (Newman and van Dam, "Recent Efforts Toward Graphics Standardization," *ACM Computing Surveys*, Vol. 10, No. 4, December 1978).

Other early work was being conducted independently on device-independent standard graphics packages, including the work on the Virtual Graphics Machine initiated by the author at Bell Northern Research in 1975, and the work on a standard similar to the GSPC proposed standard, called the Graphical Kernal System, from Germany. The GSPC work culminated in a proposed standard, referred to as the Core System, which has been used as the basis for several commercially available device-independent graphics software systems.

The need for standardization has become widely recognized by the manufacturers of graphics hardware, to the extent that at least two are currently producing systems that contain Core-compatible firmware, even though the Core System is still a proposed standard. In the U.S., the American National Standards Institute is studying standards in the areas of a Core-like, full three-dimensional standard, a small Core subset and a virtual device/metafile. At the international level, the two work items are the German GKS package and the metafile. At this writing, it is not clear how the two programs will be reconciled.

Applications Standards

Some degree of standardization has also been attempted in the area of graphics application software. Originating from in-house graphics packages, these general applications software systems provide the ability to produce x-y graphs, pie charts, histograms, three-dimensional surface graphs and other similar data representations. By having the user select the type of graphs desired, data and titles are supplied in the correct format and specific output device.

These systems range from being fairly small, with somewhat restrictive capabilities, to large systems with features that are rarely exercised. Costs vary considerably based on the capability of the system and leasing/purchase price, installation charge, maintenance contract and so forth and can range from $5,000 to $40,000.

The problem with the large software systems is the same as that with the large data base management systems; that is, 80% of the code may do 80% of the application, but the other 20% of the code may not be used (but must be paid for, maintained and reside on the system). The other 20% of the application either doesn't get done or must be done on another system (or by code that is patched into the large system, thereby jeopardizing the maintenance contract).

The trade-offs between buying a large general-purpose graphics system and writing one in-house must be examined very carefully before committing to one option or the other. Either choice can be both unsatisfactory and very expensive if the decision is not made carefully.

Looking Into the Crystal Ball

The computer graphics field is changing at a tremendous rate, even when compared with the spectacular changes taking place in the DP industry in general. As the technologies improve, the application areas using graphics will become broader and the impact of communicating information by utilizing computer-generated pictures will become much greater.

The technological improvements will be on two levels — evolutionary and breakthrough. Evolutionary changes include using more intelligent terminals with graphics computers. Graphics systems will become widely available with greater processing power and more storage capability, with multiple microprocessors handling various functions within the systems. In general, graphics terminals will cost more than they do today, but will have much greater capability.

Video disk technology will make masses of data immediately available to the systems. Applications will be

(Continued on In Depth/34)

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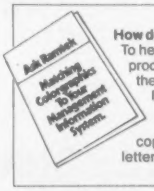

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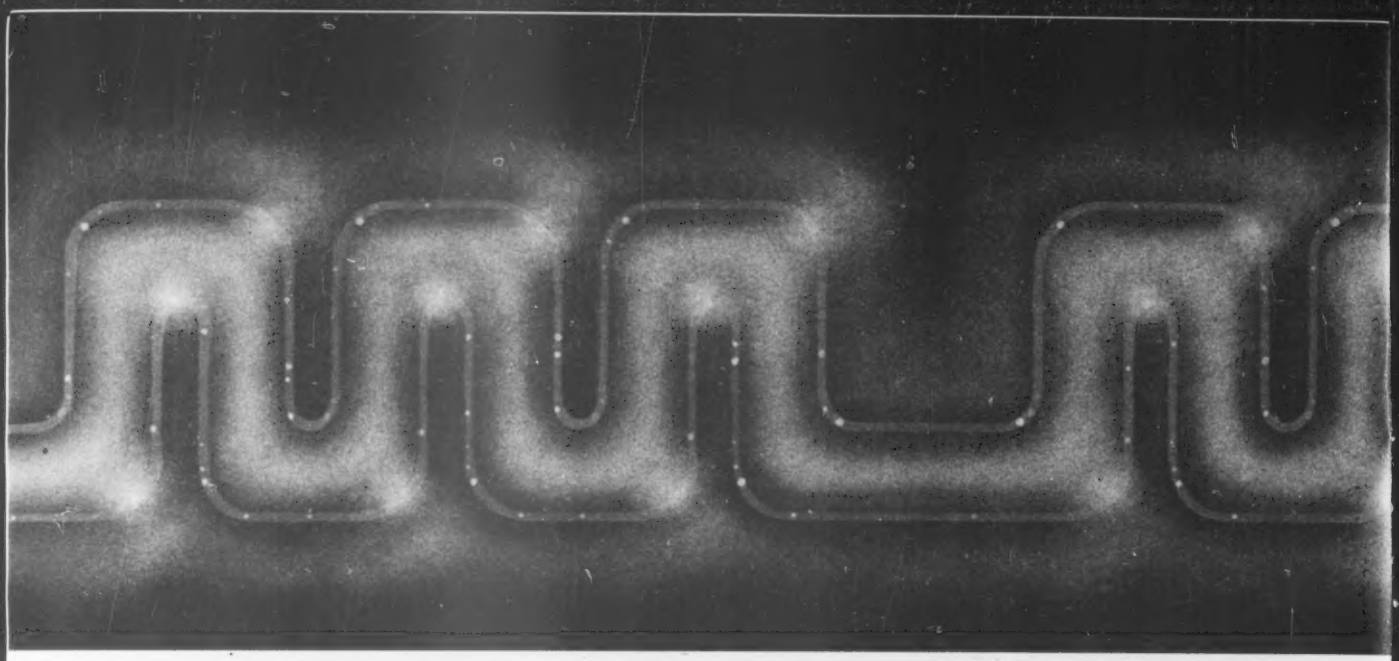
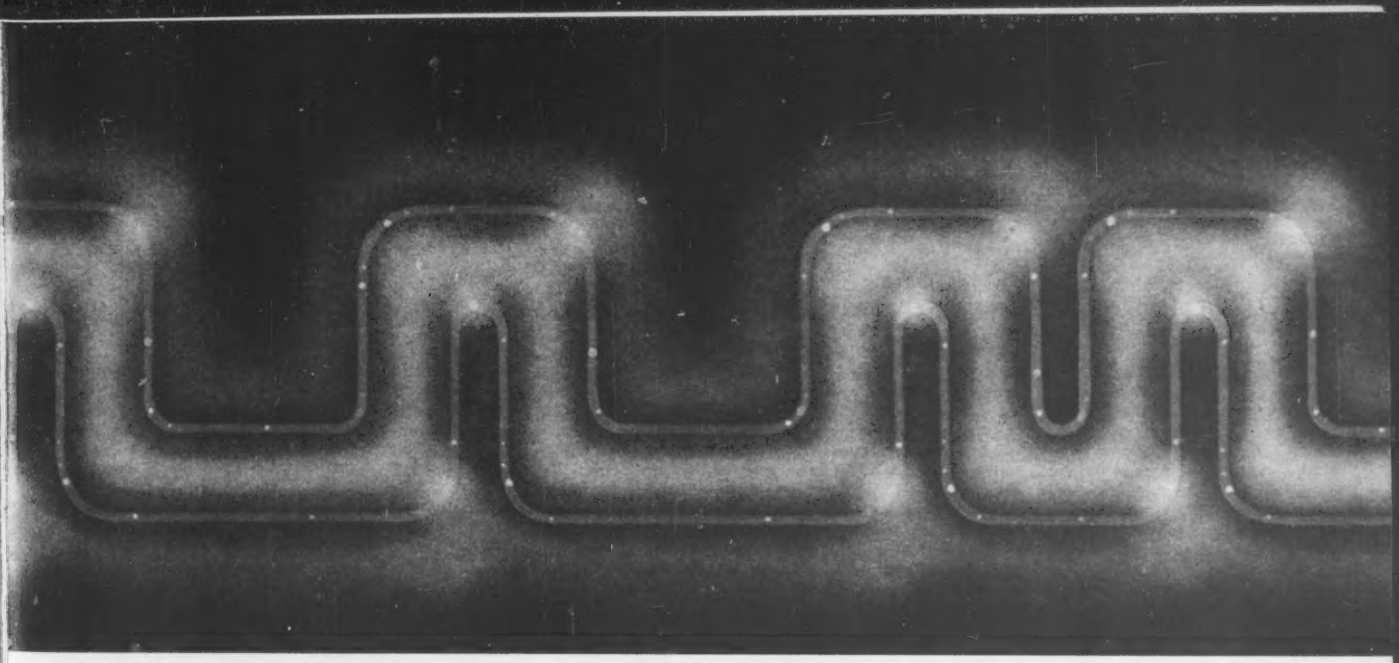


Information management's expanding vistas.



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IN DEPTH

(Continued from In Depth/31)

available on printed circuit boards, much in the same way that language interpreters are available today. Automatic routers for printed circuit boards will be microcoded and blown into programmable read-only memories, as will other applications such as business simulations and project management packages. Color graphics will become more widespread as more users learn how to apply color effectively to present information.

Because of this trend, and because of the increased speed with which images can be displayed and modified, display tube sizes will generally not get any larger. The principle for displaying information will be to display only what is pertinent at the time, but to make adjacent information immediately available. Larger screens make it too easy to display pictures that contain too much information, resulting in cluttered pictures, confused users and a drop in the amount of information that is actually communicated. Color, faster processors and large amounts of online storage will be utilized to avoid this problem.

Two technological breakthroughs that will probably be made in the next six to 18 months will have a tremendous impact on the graphics industry itself, but more so on the overall use of computers in business.

The first is high-resolution color. As mentioned in the section on raster graphics, the goal is to produce a flicker (jitter)-free, crisp, full-color image with a resolution of 1,000 by 1,000 pixels. This involves scanning 1,000 lines of 1,000 pixels each, 60 times a second, with each pixel having three or more corresponding bits in the frame buffer. The monitors will soon be available.

As mentioned earlier, the Mitsubishi C8912 color monitor will scan 900 lines 60 times a second (1,800 lines noninterlaced), and Mitsubishi has stated its intent to produce a 2,000-line monitor. When this breakthrough is made and the price becomes competitive, high-resolution and color displays will virtually replace storage tubes.

The other major technological breakthrough is expected in the area of inexpensive color hard copy. At this writing, a satisfactory color hard-copy unit is not available for the majority of graphics applications. However, competition among manufacturers is fierce. Cost-effective, inexpensive, high-quality color graphics hard copy should be available within 12 months.

Significant changes will also occur in almost all graphics application areas, not only because of the technological advances. We will see greatly improved user interfaces providing a friendly environment, along with increased awareness of how well computer graphics conveys information.

Consumer Graphics

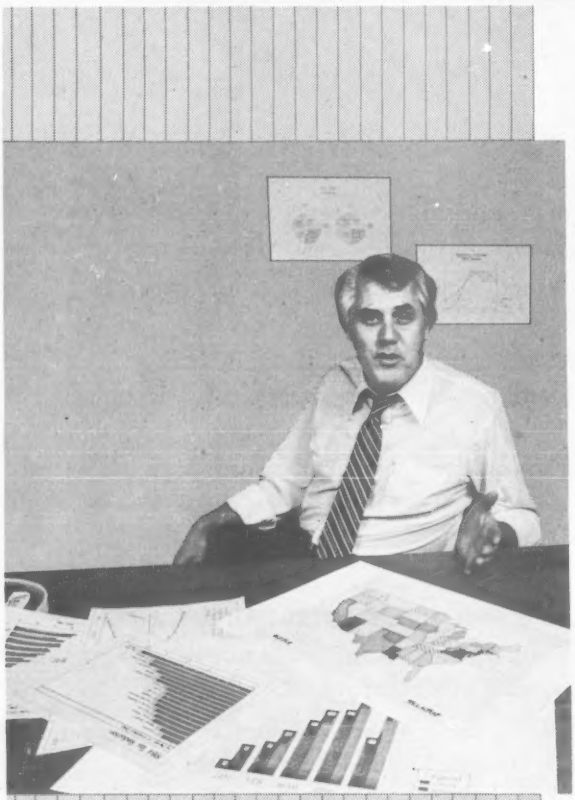
The public's acceptance of graphics will come mainly through the entertainment and advertising industries. Computer animation laboratories, such as the one at the New York Institute of Technology, are already producing spectacular television advertising, such as the Levis and Wang commercials. And graphics will be used even more extensively than before in films on the order of "Star Wars" and "The Empire Strikes Back." In fact, a computer animation studio is currently being set up at Lucasfilms, Ltd. in San Anselmo, Calif., which will use computer graphics extensively in the production of feature films.

Office Graphics

Word processing will be dramatically affected by computer graphics. The term "word processing" is actually a misnomer. The activity is really document preparation, of which word processing is a subset.

Editing a document may realistically be considered a graphics process. For instance, when paragraphs are moved or deleted in a manually generated document, they are identified by location and the area they occupy, not by line numbers and character positions. The same process occurs in regular computer graphics systems.

Graphics will affect the document preparation field in two ways: editing will be done graphically, that is, by identifying the area to be moved



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IN DEPTH

and pointing to where it should be moved (already available on a few systems). It will be possible (and even convenient) to include graphics such as charts and graphs in the body of a document without resorting to cut-and-paste techniques.

Industrial Graphics

The computer-aided design/computer-aided manufacturing (CAD/CAM) industry will be profoundly affected by this new technology. The market is expected to grow 40% to 50% a year for the next five years.

CAD systems are computer systems with graphics capability that are intended for specific applications such as mapping, piping, printed circuit board and integrated circuit design and mechanical design/drafting. They typically consist of a mainframe minicomputer and console with tapes and disks, one or more graphics terminals, often a digitizing table and tablet, a printer, one or more plotters, plus systems and applications software.

The computing hardware is generally either purchased from a major vendor or built in-house, as are the graphics terminals. The software is almost universally designed by the vendor for the particular application.

The CAD system vendors offer single-source turnkey systems. To complicate this situation, some of the major computing system vendors have purchased the rights to application software packages and are offering the combination as a standard system. In addition, the vendors of CAD systems software will often do the same thing, having entered into agreements with the major computing system vendors. This leads into the unlikely situation of software vendors selling hardware.

With CAD's options and applications increasing rapidly, it is very important to understand specific system requirements. A CAD system almost always has more of an impact on an organization than was originally assumed. The impact can be quite positive, but when a mistake is made, it is usually a beauty.

The terms "computer-aided design systems" and "computer graphics systems" are often mistakenly used interchangeably. CAD systems are integrated hardware and software computer systems designed for a particular application or set of applications and include graphics capability. General graphics systems, on the other hand, are not oriented toward a specific application, but they provide graphics capability that can be utilized by any application requiring that capability.

This distinction is becoming less and less clear, however, with the onslaught of intelligent graphics terminals, satellite systems, graphics computers and so-called "business graphics" systems. It is in business and management that graphics will have the greatest impact.

The combination of computer graphics' power, the technology's maturation, the increased attention

(Continued on In Depth/36)

The Latest On Graphics

Two excellent newsletters cover current developments in computer graphics:

- "The Harvard Newsletter for Computer Graphics." Harvard Laboratory for Computer Graphics, Subscription Department, P.O. Box 89, Sudbury, Mass. 01776. Twenty-four issues cost $125.
- "The Anderson Report." Anderson Publishing Co., Simi Valley Business Park, P.O. Box 3534, Simi Valley, Calif. 93603. Twelve issues cost $75.

Two organizations concern themselves with computer graphics developments. They are:

- SIGGraph (Special Interest Group on Graphics). Association for Computing Machinery, ACM-SIGGraph '81 Conference Office, 111 E. Wacker Drive, Chicago, Ill. 60601, (312) 644-6610.
- National Computer Graphics Association (NCGA). 2033 M Street N.E., Washington, D.C. 20036, (202) 466-5895.

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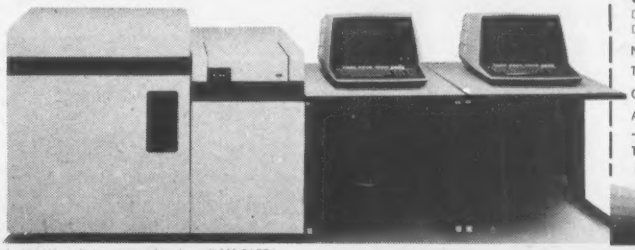

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IN DEPTH

(Continued from In Depth/35)

being paid to the user and the vast amount of data used in running businesses will cause the widespread use of computer-generated pictures as part of the decision-making process of many companies. In a recent article, David Friend, president of Friend Information Systems, stated: "About 80% of the decisions can be made with about 20% of the information, so one way for a manager to increase his efficiency is to cut back the amount of information he receives and focus on the important 20% of core information" ("Color Graphics Information Systems Boost Productivity," *Mini-Micro Systems*, May 1980).

Computer graphics may provide the only feasible means by which this can be accomplished.

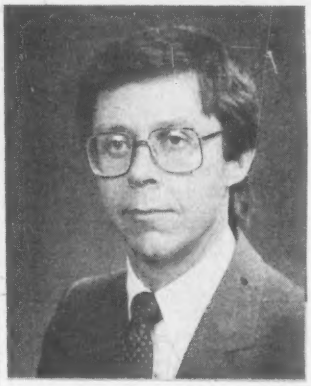
As stated previously, one of the major stumbling blocks to the widespread use of computer graphics for management is the lack of cost-effective color graphics hard copy. When this becomes available, graphics use will skyrocket.

Once computer graphics for management purposes is well established within a company, it will be used more and more frequently for boardroom presentations. With currently available technology, it is a straightforward process to create a set of presentation frames, store them on a floppy disk and call them up to be displayed as required. The pictures can be modified during the presentation if desired and stored back on the floppy disk as modified for subsequent use. In addition, with video compatibility available on many raster graphics systems, the picture being displayed can be projected onto a large screen at the front of the boardroom.

The next step, then, is to use this configuration in conjunction with standard voice teleconferencing to produce a system that combines voice and data conferencing (including graphics) through the standard telephone network to several remote locations with similar facilities. The technology for this is available today, off the shelf, and is relatively inexpensive.

Finally, the home/hobby/personal computer is having a serious effect on computing in general and on the use of computers on a small scale. This interest area began "underground," but is now of major proportions. It is too early to predict how it will happen, but the use of graphics in these systems is going to have a surprising and positive impact on the field of interactive computer graphics in general. It is definitely something to watch for.

Computer graphics is no longer just an expensive toy. The technology has matured, and the market for its application is huge. The question is no longer whether an organization can afford to utilize computer graphics, but whether it can afford not to.



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Electronic Switches — Part 2

Tour of Networks Shows Need for Switches

By Gilbert M. Kaufman
And David G. Tolwinski
Special to CW

To illustrate the need for intelligent electronic switching, we will briefly tour a few present-day networks where such switching plays a vital role.

Our first example is a large on-line service network with three regional computing centers, each supporting a particular set of applications. The network manager is responsible for seeing that none of its widely dispersed users perceive any appreciable downtime.

He would like to concentrate his small group at the headquarters site and somehow provide monitoring, diagnostic information and reconfiguration control for his domain. Additional challenges arise because a variety of vendors and equipment types are represented.

Remote channels serving a variety of terminal types and line protocols are statistically multiplexed from scattered district sites to regional computing centers. At each regional center, a large CPU with companion front-end processors provides a set of data processing applications to synchronous data users.

Asynchronous data users are supported by several minicomputers with specific applications and data bases. The regional centers are interconnected by multiplexed channels that serve several purposes.

For economic reasons, users are multiplexed or directly connected to their nearest regional center, and from there they are routed to the regional center that actually supports the desired application.

The critical multiuser equipment elements in this complex network include large CPUs, minicomputers, front-end processors and statistical multiplexers. For all but the first of these, the most effective backup consists of on-site spares, whereby a reserve device is substituted for a failed device.

This is the second half of a two-part series on intelligent electronic switches, which the authors see as a boon to performance evaluation of a user's full data network.

For minicomputers, data base transferal is accomplished by DP support personnel. Because a reserve (very expensive) CPU at each regional site is neither practical nor feasible, the network manager has devised a clever distributed backup scheme.

Each regional site provides primary service for its on-line synchronous applications as well as backup service for another site's applications. The interregional multiplexed links are used continuously for the maintenance of duplicate data bases, and if a regional CPU fails, its users are switched to the appropriate backup site.

One approach to this complex switching problem would involve extensive use of remote-controlled A/B patching equipment. Every conceivable failure scenario would be determined and an appropriate alternative ("B") response would be arranged.

But this approach eventual-

(Continued on Page 72)

Wang Modem Operates With Bell, Racal-Vadic

LOWELL, Mass. — Wang Laboratories, Inc. has introduced an asynchronous/synchronous modem for 300- and 1,200 bit/sec operation compatible with Bell's 212A and 103J sets and Racal-Vadic, Inc.'s 3400 series.

Built for Wang by Racal-Vadic, the full-duplex WA3451 modem supports Wang's 2236DE interactive terminals that run with the vendor's 2200 series computer systems.

In asynchronous mode, it is Wang's recommended modem for dial-up remote connection of these terminals to 2200 LVP or MVP systems and for use with the vendor's 2200 Remote Control and Maintenance (RCM) software that allows other terminals to emulate 2236DEs.

The WA3451 can also be used with Wang asynchronous emulation software such as 2200 Teletype (for Teletype Corp. terminals), IBM 2741, VS teletypewriter and Teletype for Wang Office Information Systems (OIS) and Word Processing Systems (WPS).

A WA3451 modem can also run with Wang synchronous emulation software for data communications between a Wang system and a host or terminal that supports IBM 2780, 3780, 3741 or 3275 binary synchronous protocol, a spokesman said. Synchronous WA-3451s can also support transfer of files and documents among 2200, OIS, WPS and VS systems.

Mailway Support

The Wang modem is not compatible with Bell automatic-dialing units, but does support all levels of Wang's Mailway electronic mail and message system.

To use WA3451s with Mailway Level II or III for automatic dial-up operations, a Mailway distribution center can be configured with Bell 212A-equivalent sets and Bell 801 automatic-dialing units, the spokesman stated.

Available with a range of self-diagnostic features, the WA-3451 costs $1,050 in quantities of less than 50. Larger orders lower the unit price to $990 and maintenance runs another $12/mo, the Wang spokesman said from One Industrial Ave., Lowell, Mass. 01851.

Harris Fiber-Optic Link Extends Channels for 9200

DALLAS — Harris Corp. Data Communications Division has announced a fiber-optic link for its 9200 information processing system said to extend the maximum direct-channel attachment between an IBM host and 3270-type displays and printers from 1.5- to 3.5 km.

Designed for data processing networks in large office or industrial complexes, the Harris fiber-optic link transmits data by light impulses at speeds up to two million bit/sec, the company said. The link allows displays and printers which normally communicate with a host over transmission facilities to have direct channel access, the vendor claimed.

Available with the company's 9200 systems in September, the fiber-optic link will lease for between $200 and $240 per month based on a two-year lease and will carry a purchase price of between $7,000 and $9,000 from Harris Corp. Data Communications Division, 16001 Dallas Pkwy., Dallas, Texas 75240.

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Northern Telecom 76 Made SNA-Compatible

MINNEAPOLIS — Northern Telecom, Inc.'s Electronic Office Systems Division has enhanced its Model 76 batch terminal system to include Systems Network Architecture (SNA) compatibility.

The SNA/Multiple Logic Unit (SNA/MLU) emulator handles up to six jobs concurrently on the Model 76 system.

It also supports up to three line printers (225- to 1,250 line/min) and four magnetic tape drives (9-track, 800- or 1,600 bit/in.), as well as a card reader, card punch, diskette and communications up to 19K bit/sec, according to the firm.

The emulator costs $100 from the firm at Data Park, P.O. Box 1222, Minneapolis, Minn. 55440.

Tour Shows Need for Switches

(Continued from Page 71)

ly becomes intractable as network complexity grows and the possible failure permutations multiply. Dedicating specific equipment for each failure node becomes quite inefficient (expensive). Each network expansion or addition requires extensive (also expensive) planning and recabling. And then comes the day when an unanticipated failure occurs (so no appropriate "B" is available).

What the network manager needs is a general "any-input-to-any-output" connection mechanism he can control remotely: an intelligent electronic switch.

Each switch in the network can be monitored and reconfigured from headquarters. Anticipated failure configurations can be planned and stored off-line. Headquarters personnel can use monitoring features to display and analyze channels from any part of the network.

Pools of duplicate equipment, extra ports and spare channels can be matrix-switched to circumvent network problems. Offline configuration storage and a powerful human interface allow preplanned fallback programming as well as reactive problem solving.

Second Example

The second example is an innovative banking network. A large, very secure DP center contains several computers and associated front-end processors. Multiplexed modems provide backbone point-to-point links to regional data concentration sites. From the concentrators, a second network tier of multipoint circuits is supported to service interactive banking terminals in the branch banks themselves.

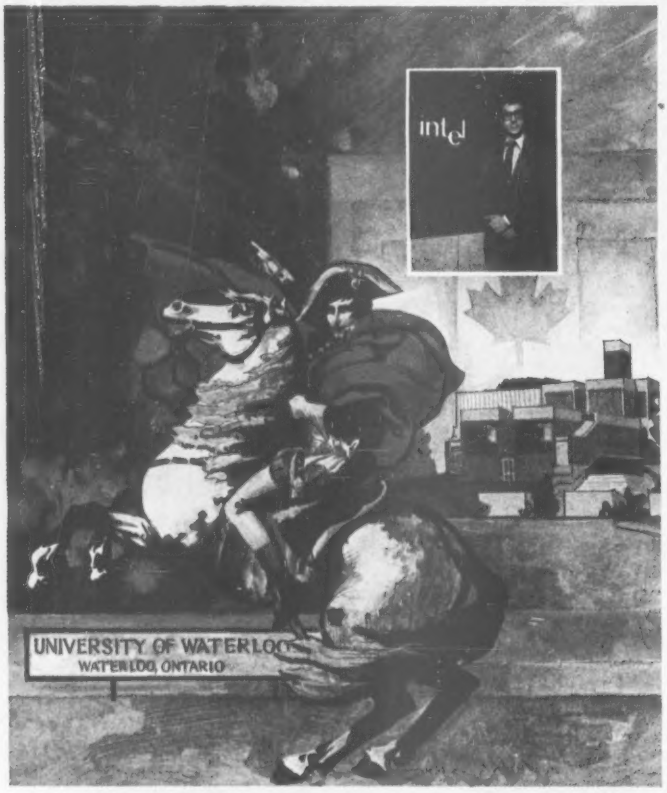
The central site network manager must provide reliable data communications service to the branch banks. This is essentially a point-of-sale application with no communications expertise at the remote sites.

An intelligent electronic switch at the central and concentrator sites provide several degrees of fallback and control to this vital on-line network.

Failure of a concentrator port is counteracted by switching the affected multipoint circuit to a spare concentrator port. Complete failure of a concentrator results in distribution of its multipoint circuits among the spare ports of adjacent concentrators.

Finally, we come to a network with especially expensive (long-distance, wideband) data links. The intelligent electronic switch at each link junction optimizes utilization. A variety of equipment can be quickly connected over available channels or subchannels.

Kaufman and Tolwinski are engineers at Codex Corp., 20 Cabot Blvd., Mansfield, Mass. 02048.



At Waterloo, Intel's FAST-3805 won.

The FAST-3805 saves the University of Waterloo thousands of dollars each month while it increases both user and system productivity. Waterloo's Associate Director-Systems, Romney White, explains how . . .

"Compared to any other DASD, the FAST-3805 in Native Mode* is the fastest thing going. It has a large enough capacity to satisfy the biggest users around, and it's a cost-effective solution. In other words, the FAST-3805 is really an ideal paging device.

"The FAST-3805 reduces paging overhead and increases paging capacity. It's an economical solution for extending current CPU resources."

Increases productivity

"We discovered that our 4341 by itself supported only 25 active users. With the FAST-3805 we were able to double the number of active users at less than half the cost of a new processor. And those users got more consistent and faster response times.

"We found the FAST-3805 eliminated page wait and the page wait that masquerades as I/O wait, as well as reduced device, controller and channel contention. The result was more users who are more satisfied."

Fast paging saves dollars

"On our 3031 we had a page wait of about three percent with two 2305s. However, when we switched to a FAST-3805—which brought in pages about two and a half times faster than the 2305s—the page wait went to zero. In our situation, switching to the FAST-3805 saved us a couple of thousand dollars a month in system and people time. But a user who has a 3033 with a 15 percent page wait could save $15,000 to $20,000 a month.

"Not only did the FAST-3805 take the place of two 2305s and a 2835 controller at Waterloo, but it helped us avoid the purchase of another 2305/2835 system. With the FAST-3805's increased capacity, we were able to stay within our budget . . . and still meet the increased needs of our users.

"Because we wanted to get the most out of our current system, we saw the FAST-3805 as a good investment. We looked at the available paging devices and determined that the FAST-3805, because of its micro-coding, offered the most flexibility.

"The installation was a breeze. Service has been good—and the unit is essentially self-diagnosing. The FAST-3805 is much more reliable than our previous disks.

"In summary, Waterloo got more capacity, better performance and better reliability for less money with Intel's FAST-3805 semiconductor disk."

If you are interested in learning how the FAST-3805 can unleash your system resources and increase your personnel and system productivity, contact Intel's Marketing Information Office at 512/258-5171. Or clip and mail the coupon below.

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*Native Mode and 2305-emulation are two personalities of the FAST-3805 currently available.

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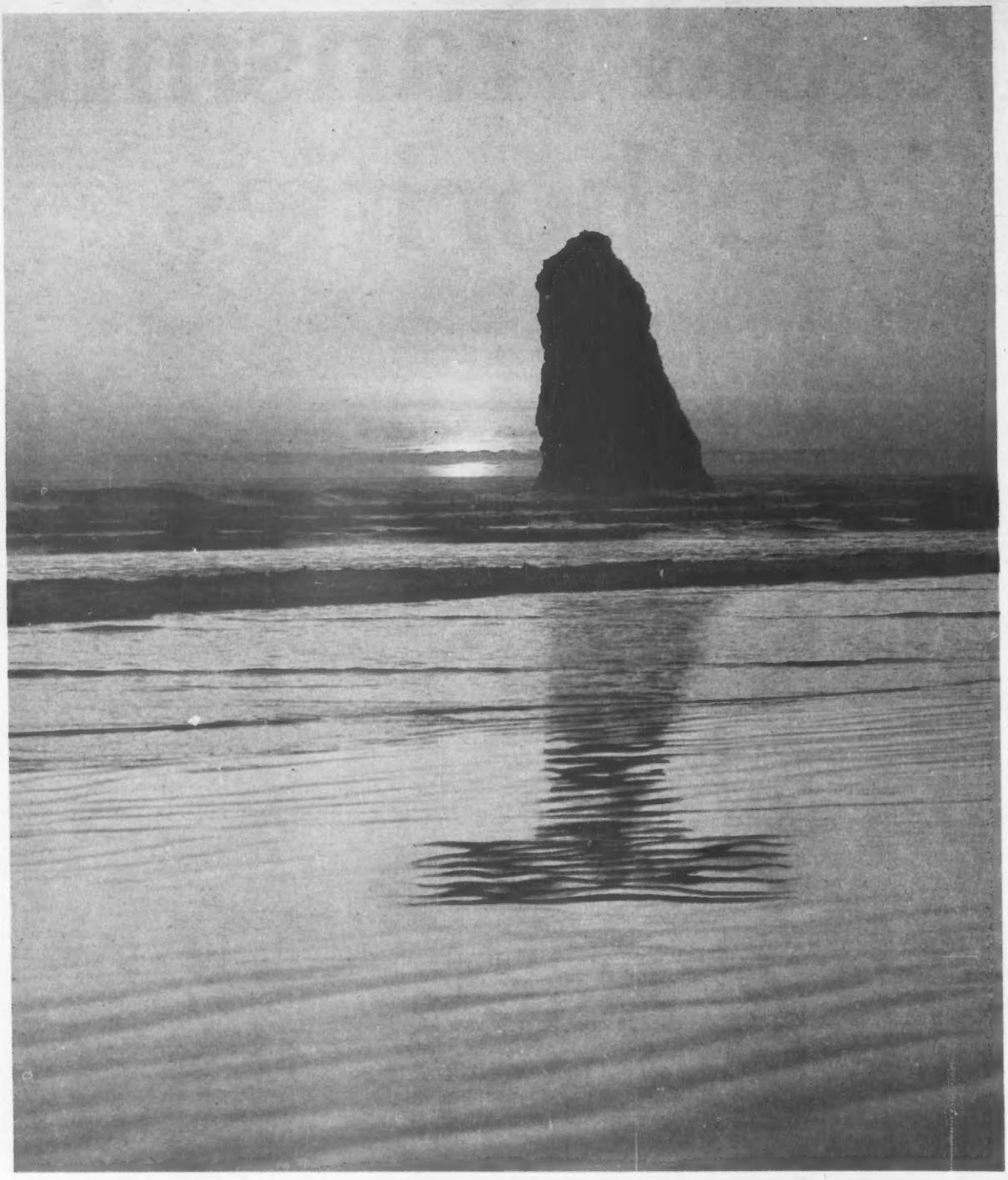

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Phoenix Digital Unveils Network Control Modules

PHOENIX — Phoenix Digital Corp. has announced the NCM-6809 and NCM-6809² series network control modules that can be used with the firm's high-speed multiprotocol synchronous communications port.

The modules support IBM's Synchronous Data Link Control (SDLC), High-level Data Link Control (HDLC) and Digital Data Communications Message Protocol (DDCMP) protocols. They can be used as stand-alone minicomputers or as communications controllers connected with other NCM-6809/6809² modules via a high-speed synchronous communications port to form a distributed network, the vendor said.

Both the NCM-6809 and the NCM-6809² offer a CPU, a multiprotocol high-speed synchronous communications port, an RS-232C communications port, direct memory access capability, power-on restart circuitry, system clock and timing circuitry, the vendor said.

Prices start at $895, the vendor said from 2315 N. 35 Ave., Phoenix, Ariz. 85009.

Unit Aimed At Graphics

ATLANTA — A color graphics CRT terminal, featuring a 1,920-char. alphanumeric character display in a 24-line by 80-column format with 720 by 288 graphics resolution, has been announced by Colorgraphic Communications Corp.

The MVI-7 has a detachable 87-key keyboard and standard video features include blink, highlight, foreground and background color and underscore, the company claimed.

The standard emulation package includes Digital Equipment Corp. VT100 and VT52, IBM 3101, Hazeltine Corp. 1500 and Lear Siegler, Inc. ADM3 and Adds, with selectable rates of 100- to 19,200 bit/sec, the vendor said.

The MVI-7 is priced at $3,500 from Colorgraphic Communications Corp., 2379 John Glenn Drive, Atlanta, Ga. 30341.

Users' Guide Covers Security

HAGERSTOWN, Md. — Marketing Consultants International, Inc. is offering a users' guide on voice and data communications security.

Formerly available only to government agencies, the directory, entitled *Who, What and Where in Communications Security*, provides a discussion of the problems of communications security.

The publication is written for the nontechnical user and is said to help explain complex issues.

The guide costs $175, $200 including postage, from the vendor at Suite 214, 100 W. Washington St., Hagerstown, Md. 21740.

Data Recorder Bows

Bit-Error Rate Tester Debuts

LINCOLN, R.I. — International Data Sciences, Inc. is offering a bit-error rate tester and a data recorder.

The Model 65/60 bit-error rate tester is a miniaturized modem test set capable of performing tests on synchronous and asynchronous data communications channels. Combined with the vendor's Model 60 breakout panel, it is known as the "Red Box".

The tester contains separate transmitter and receiver sections, allowing full-duplex tests to be performed in either end-to-end or loopback configurations.

It costs $915, the vendor said.

The Model 7000 Datatape provides nonvolatile mass storage for digital data associated with RS 232C and V.24 communications interfaces.

The product records transmit data, receive data and seven control signals. Operation is independent of data code, line protocol, code level and parity for synchronous and asynchronous data links, according to the vendor.

It costs $6,050 from International Data Sciences at 7 Wellington Road, Lincoln, R.I. 02865.

General Electric's broad line of data communication equipment now includes Racal-Vadic's revolutionary new Modemphone now available for lease. It looks just like a standard rotary or tone telephone, but has a built-in 103/113 compatible 0 to 300 bps full duplex modem that's completely invisible. It is FCC-registered for direct connect and is full originate/answer, too.

All you do is plug the terminal cable into the Modemphone's RS232C connector, plug the 8-foot switched network cable into the voice or data jack, and start communicating. There's no need for separate modem and associated wiring that increases your set-up time. Optional automatic answer is also available.

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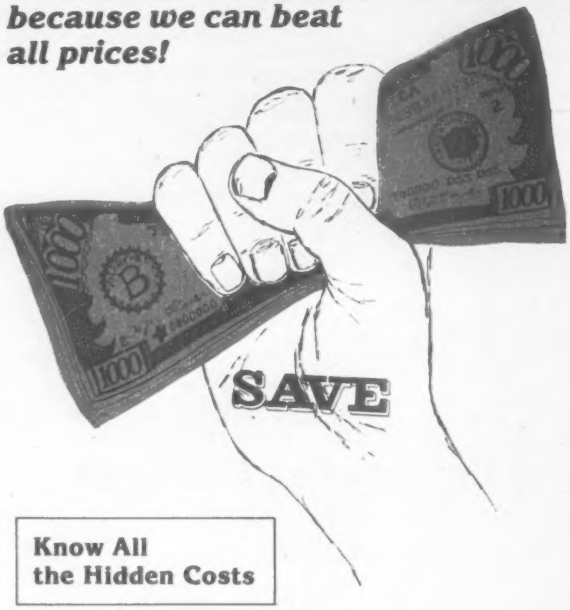

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Communications Processor Performs Print Buffering

HICKORY, N.C. — A communications processor containing a single-board microcomputer and 16K bytes of random-access memory (RAM), which performs print buffering similar to the effect generated by a software printer spooler, is being offered by Carolina Business Computers, Inc.

Called "Our Blue Box," the unit can be connected between the user's RS-232C Ascii asynchronous output port and the printer's RS-232C input port, the vendor said.

It buffers up to 16,000 characters of transmitted data from the computer at up to 9,600 bit/sec, while simultaneously transmitting the data to the printer, also at up to 9,600 bit/sec. Input/output bit/sec rates are jumper-selectable and both positive and negative handshake levels are available on the standard 25-pin D connectors.

Originally intended to provide compatibility between Data General Corp. computers and non-DG printers, the device can work with most micros and minicomputers, the firm said. Our Blue Box costs $595 from the firm at Oakwood Center, 350 Third Ave., NW, Hickory, N.C. 28601.

Microm Tool Links Apple Users To TWX, Telex, Western Union

BOSTON — Microm, Inc. has developed software designed to provide electronic mail and communications lines for Western Union, TWX and Telex to Apple Computer Corp. Apple II users.

Micro-Courier allows users to transmit charts, graphs, correspondence, Visicalc reports and entire programs to other Apple computers over standard phone lines.

The transmissions can be sent automatically, allowing the user to take advantage of low night rates, according to the vendor.

Micro-Telegram allows users to access Western Union Service worldwide. Besides sending telegrams, Apple owners can send and receive TWX, Telex and international cables, the vendor said.

The software licenses for $250 each, Microm said from 89 State St., Boston, Mass. 02109.

T-Bar Uses Switching Technology In 256 by 256 Large-Scale Matrix

WILTON, Conn. — T-Bar, Inc. has introduced what it calls the industry's first available large-scale matrix (as large as 256 by 256) using switching technology to provide transparent, nonblocking switching for use in configuration, monitor and test requirements.

In operation, the Virtual Switch Matrix (VSM) is comparable to the equivalent of more than 65,000 16-line switches, the firm said. A user may instantaneously connect any data terminal equipment port to any data communications equipment port in a network.

No master clocking requirements are needed, the firm said. Because the VSM is transparent, it can handle a random mix of synchronous and asynchronous data without a clock.

It requires reduced space requirements and can switch all 16 major EIA circuits for each data line.

The matrix provides up to 10 monitor outputs and 10 DCE and 10 DTE test ports. Additionally, it requires no programming or predefined individual ports.

Depending on the number of data lines switched, the cost for the VSM ranges from $100,000 to $350,0000. T-Bar is at 141 Danbury Road, Wilton, Conn. 06897.

DCC Updates Unique Systems Line

MEMPHIS, Tenn. — Data Communications Corp. (DCC) has announced two software enhancements to its Unique product line of minicomputer-based DP systems.

Interactive protocol emulators for Burroughs Corp. TD-830 and Sperry Univac UTS-400 networks are said to give users of those mainframes economical remote-processing capabilities similar to 3270-emulator operations in IBM networks.

The Unique family of stand-alone and distributed processing systems — based on Data General Corp. computers — allows concurrent multiuser operations including data collection, transaction processing, data base inquiry, word processing and 3270 emulation with local format storage capability.

Multiuser turnkey hardware/software systems begin at $50,000; Unique software for existing DG installations ranges from $2,000 to $50,000. The Burroughs TD-830 and UTS-400 emulators are available in 60 days.

Either enhancement will add $6,000 to the price of a DCC Unique system.

DCC is headquartered at 3000 Directors Row, Memphis, Tenn. 38131.

Emtrol Offers Modems for Micros

LANCASTER, Pa. — A direct-connect modem for microcomputers with or without a disk and featuring originate/answer, programmable word length, parity, number of stop bits and full and half duplex has been announced by Emtrol Systems, Inc.

Covered by a one-year warranty, the Lynx is priced at $289.

Emtrol Systems, Inc. is headquartered at 123 Locust St., Lancaster, Pa. 17602.

Offers File Management

Inforex Rebounds With DDP System

BURLINGTON, Mass. — Inforex, Inc. last week introduced a distributed data processing (DDP) system that it said combines traditional DDP functions with file management, data entry and multiuser Cobol facilities.

The System 9000 is based on the company's distributed information processing concept and supports the firm's Infobase data management, Universal Data Entry (UDE) and Ultranet networking system software. System hardware includes a processor with 248K bytes of memory, up to 180M bytes of disk storage and an optional nine-track magnetic tape drive.

However, the computer is designed in a "building block" mode, which allows it to be expanded to fit user applications.

The System 9000 is reportedly the first computer unveiled by Inforex since the firm reorganized its activities under Chapter 11 of the bankruptcy laws last year and was subsequently merged with Datapoint Corp. [CW, June 23].

The System 9000 Distributed Information Processing System

One of the DDP system's main features is that users can begin entering, accessing and manipulating data, and then generate reports almost the moment the system is plugged in, a spokeswoman claimed. This is possible because the computer's data entry and data management software is already programmed and requires no additional user commands.

Users interact with the system through Inforex's Universal Workstation, a multifunction terminal designed to take advantage of the processor's data entry and report generation capabilities, the spokeswoman noted.

The workstation features a software-defined typewriter-style and keypunch-style keyboard. It also has internal diagnostics capabilities for trouble-shooting and repair.

Focus Is Software

The heart and soul of the system is its software, which is made up of three major portions: Infobase, UDE and the Multiuser Cobol.

Infobase reportedly guides the user through file creation in a question-and-answer format. As the user answers each formatting question, the software creates files and identifies access keys. Application programs are generated as needed and automatically handle such things as page breaks, report and column headings and printing.

UDE, which supports both source- and volume-level data entry applications, prompts operators through each data entry step. Errors are reportedly indicated immediately and the software's editing and verification routines check each record in the user's file.

The system is geared to handle large batches of data entry material, while providing supervisors with operator entry statistics, the spokeswoman said.

With the Multiuser Cobol, users can write programs while data entry, file access, data reporting and communications are in progress, she added.

(Continued on Page 78)

Doubles Speed, Capacity

Pertec 3600 Replaces 1800 System

LOS ANGELES — Pertec Computer Corp. has announced the Pertec 3600, a distributed data entry/clustered processing system that replaces Pertec's 1800 system.

The 3600 doubles both the speed and the capacity of the 1800, the vendor said, and features multiport communications, Winchester disk storage of up to 320M bytes and a processor with 500-nsec access time and 512K bytes of main memory.

The system functions simultaneously as an intelligent remote terminal, an on-line inquiry response system or a stand-alone, multistation, clustered data processing system, the vendor said.

The system's four communications ports were reportedly designed to accommodate large-volume simultaneous operations with as many as four mainframes. The 3600 uses IBM 3270 emulation and can retrieve information that may not be available in a local data base. This feature makes available more information without storing centralized files at each site, the vendor said.

The 3600 costs between $158,000 and $210,000 including training, maintenance and installation, the vendor said from 12910 Culver Blvd., Los Angeles, Calif. 90066.

I/O Subsystem for Cray-1/S Gains More Buffer Storage

MENDOTA HEIGHTS, Minn. — Cray Research, Inc. has enhanced the I/O subsystem for its Cray-1/S line of processors with up to 64M bytes of buffer storage, dual high-performance data streaming channels and support for on-line magnetic tape.

The I/O subsystem acts as a data concentrator for input to the Cray-1/S processor. It distributes output from the processor and operates with all front-end processors that interface to the Cray-1/S. The subsystem also controls peripheral devices such as tape and disk drives, the vendor said.

(Continued on Page 78)

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Xerox Offers Color Printer

EL SEGUNDO, Calif. — Xerox Corp. has announced the 6500 color graphics printer that reportedly combines laser scanning and Xerographic technique to produce full-color prints in a matter of seconds.

Full-color prints can be output at a rate of 3.2 per min. and single-color copies at 9 per min., the vendor said.

The printer is a raster image system that accepts serial computer data and delivers full-color images with a uniform resolution of 100 points per in. Copies have a maximum image width of 6.4 in. and length of 13.75 in., the firm said.

The unit costs $30,800 from Xerox at 880 Apollo Drive, El Segundo, Calif. 90245.

Cray-1/S Buffer Storage Increased

(Continued from Page 77)

The I/O subsystem is an integral part of Cray's Model S/1200 through the S/4400 processors. It is composed of two to four I/O processors, buffer storage, disk control units, optional block multiplexer control units, three CRT consoles and a peripheral expander and maintenance peripherals, Cray said.

The I/O processors interconnect with each other and buffer storage. The first required processor, or the master I/O processor, handles communications protocol with other mainframes. It connects with the Cray-1 processor or with one to three front-end processors. It can also connect to maintenance peripherals via an optional Peripheral Expander, Cray said.

The second required processor, or the buffer I/O processor, controls disk storage and moves data between buffer storage and Cray-1/S main memory. The processor contains one to four DCU-4 disk controllers, each of which independently controls up to four DD-29 disk storage units, each with a capacity of 600M bytes, according to Cray.

Optional Units

The third and fourth I/O processors are optional. Each may support up to 16 additional disk units or a maximum system capacity of 28.8G bytes. As an alternative, one of the optional processors may contain one to four block multiplexer controllers (BMC-4), each of which consists of four channels. Controller units for peripheral devices, such as magnetic tape units, may be connected to block multiplexing channels, Cray said.

Software for the I/O subsystem interfaces with the Cray Operating System (COS). Existing software is upward-compatible and user interfaces are fully compatible with all models of the S series.

A Kernel operating system resides in each I/O processor. The Kernel is the same for all I/O processors and is modified by system parameters during installation. The Kernel operating system handles interrupts, controls disk units and other peripherals, supports station and front-end activities, dispatches messages to and from the S series processor, handles interprocessor communications and controls load overlays, Cray said.

Buffer Memory

The buffer memory is a solid-state secondary storage unit accessible to all I/O processors in the subsystem. It is available in 1M to 8M 64-bit words, and the memory is equipped with single-error correction, double-error detection logic, according to Cray.

Buffer memory can be used as a rapid-access secondary storage unit, and Cray said it is working on software enhancements to support such a facility.

The I/O subsystems cost between $1.3 million and $2.9 million. Cray-1/S systems are large-scale statistical processors, often called supercomputers, that perform very fast mathematical calculations.

Access Through Front End

The system can only be accessed through a front-end processor and Cray currently offers interfaces for IBM 370-era processors operating under the MVS or MVT operating systems, Control Data Corp.'s Cyber 70/170 and 6000/7000 systems operating under the NOS or NOS/BE operating systems.

Interfaces are also available for Amdahl Corp., Honeywell, Inc., Digital Equipment Corp., Data General Corp. and Systems Engineering Laboratories, Inc. processors, the vendor said.

Cray is located at 1440 Northland Drive, Mendota Heights, Minn. 5120.

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Inforex Offers DDP System

(Continued from Page 77)

Finally, the system's Ultranet networking software makes it possible to expand the 9000 modularly, adding one unit at a time. File management or application processors in the network configuration are treated as independent units joined by a coaxial cable bus. Resources can be added or taken from the bus without disturbing existing applications, the spokeswoman claimed.

A local System 9000 with Ultranet costs less than $60,000. Deliveries are scheduled to begin this August, the spokeswoman said from the firm at 186 Middlesex Tnpk., Burlington, Mass. 01803.

Now, unleash the true power of your 4300-type processor.

When you chose a new 4300-type processor, it was to upgrade system performance and reduce ownership costs. Yet, if you select the wrong tape subsystem — a subsystem whose performance is not "balanced" with that of your processor — you can actually strangle throughput and reduce system efficiency. On the other hand, if you choose STC's new 4500 tape subsystem, you can achieve a balanced system, and get all the throughput and CPU utilization for which you've paid.

A subsystem matched to your processor.

The new STC 4500 is fully compatible with today's intermediate-sized processors, including IBM 360, 370 and 4300 series devices, as well as other comparable units. But more importantly, the STC 4500 incorporates speeds of 75 and 125 ips, and densities of 800 bpi (NRZI), 1600 bpi (PE) and 6250 bpi (GCR). This combination of high-speed and high-density permits the 4500 subsystem to deliver performance equal to that of your CPU, to help achieve a balanced system.

For example, if you compare an STC 4500 with today's streaming tape devices, there's no comparison at all. In data mode, a streaming tape will typically transfer data at a rate of about 20 kb per second, while the STC 4500 offers a data rate of 468 or 780 kb per second. When you use the STC 4500 to backup a high-performance disk, it outperforms 8809-type devices (see chart below) by a factor of six to one. If you consider total time, this expands to a differential of eight to one, and with 3410 subsystems, the difference is almost nine to one. In sum, the STC 4500 makes frequent disk backup a realistic and cost-efficient alternative — no matter your workload — and at your convenience.

Equally important, the 4500 subsystem also offers enhanced read/write reliability. Users who move from non-STC 1600 bpi (PE) to STC 6250 bpi drives and who take advantage of GCR blocking can reasonably expect an increase in megabytes processed per soft failure of 30 to 35 times that of PE, and an increase in gigabytes processed per hard failure of 18 to 20 times.

Reduced ownership costs.

Older, 3420-type tape subsystems deliver good performance in certain applications. But their price/performance ratio falls far short of that which you'd expect with a 4300-based system. In comparison, the STC 4500 — like a 4300 processor — was designed for use in any office environment. As you can see from the accompanying chart, this means a reduction of 40% or more in space, power, and air conditioning costs, and eliminates the need for raised flooring entirely. And in this age of spiraling inflation, this can be an important long-term consideration indeed.

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POWER (Avg. KVA)	5.12	3.06	40%
BTU/HR. (Avg.)	14,980	9,197	40%
SPACE (Sq. Ft.)	18.4	11.3	40%

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The new STC 4500 also gives you several important features you'll find on no other comparable subsystem.

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STC's new 4500 tape subsystem can be diagnosed either on-site or remotely. In either event, if one 4500 drive goes down, it can be diagnosed in-line, and serviced off-line without affecting the remainder of the subsystem's operations. Powerful, built-in diagnostics also help assure enhanced data availability. In fact, the STC 4500 has microprocessor-based diagnostics designed to make fault isolation faster and more effective by permitting the subsystem to be exercised in-line. And special "wake-up" diagnostics will exercise the memory, microprocessor, and interface at power-up to assure proper operation.

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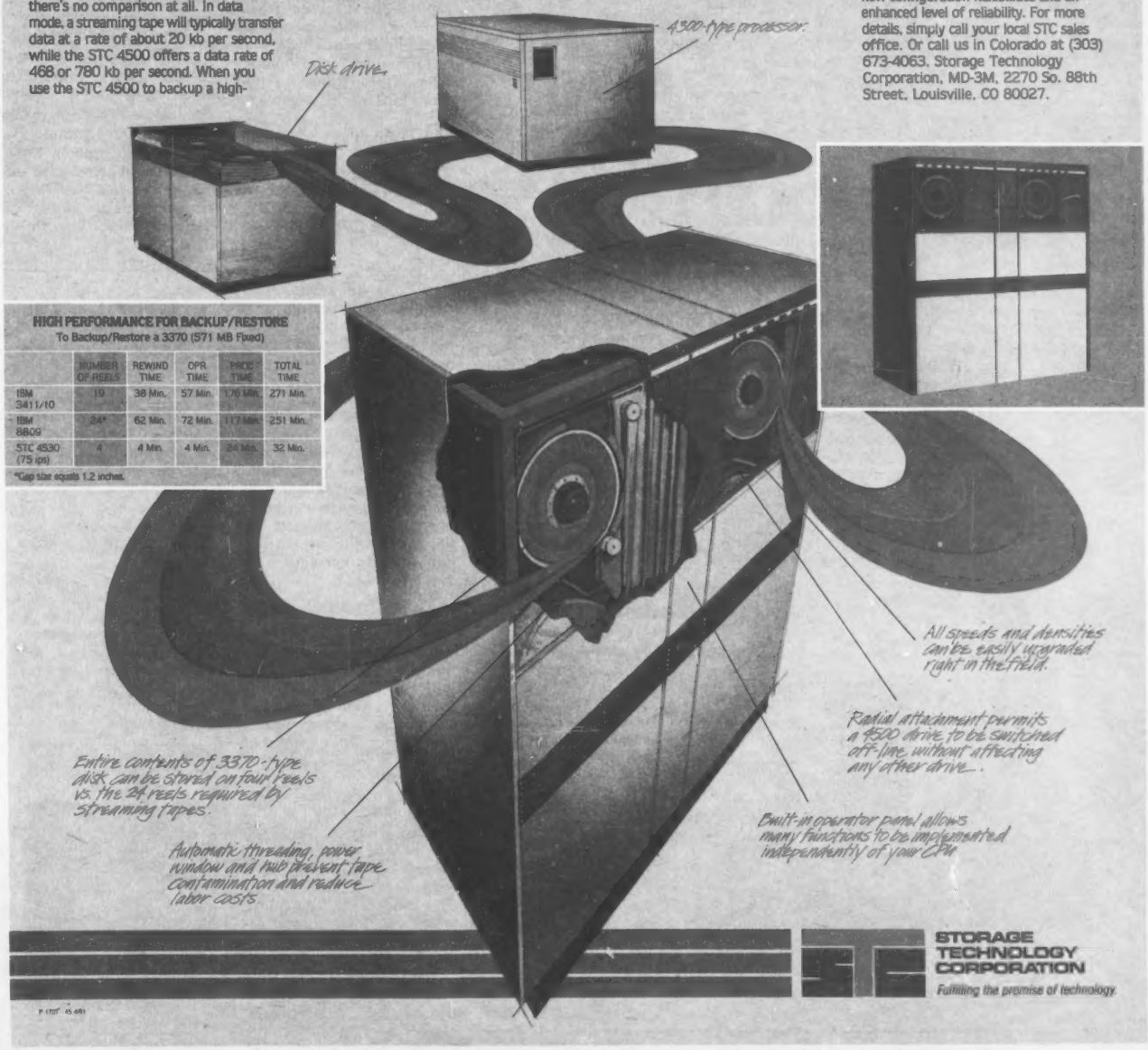
IBM 8809	24*	62 Min.	72 Min.	117 Min.	251 Min.
STC 4530 (75 ips)	4	4 Min.	4 Min.	24 Min.	32 Min.

*Gap size equals 1.2 inches.



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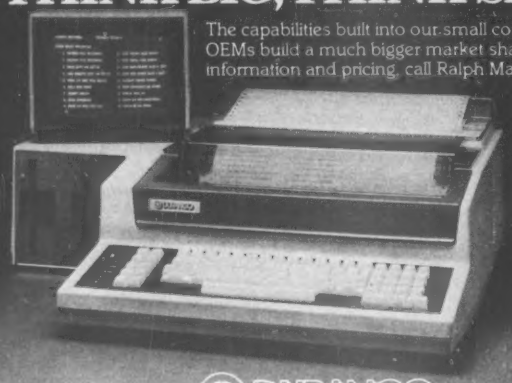

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Ink Jet Printer Suits Medium-Speed Use

SAN JOSE, Calif. — Anderson Jacobson, Inc. has announced an ink jet printer for medium-speed applications.

Called the AJ650, the printer uses a patented drop-on-demand method for applying ink to the paper in a dot matrix. Character width and spacing are variable and can be switched from a standard 80 char./line to a compressed 132 char./line format with single or double spacing, at six or eight line/in., the vendor said.

Character Types

Under processor control, the printer will print extended, boldface, upper- and lowercase characters.

The unit features bidirectional printing at a rate of 180- or 210 char./sec, yielding a communications throughput rate of 1,200 bit/sec, according to the vendor.

The AJ650 prints an 86-char. Ascii set by selectively ejecting ink drops from a seven-nozzle print head as it moves across the page. Characters are approximately .1 in. high with seven vertical and five horizontal dot positions per character, the vendor said.

No Impacting Parts

The unit does not have impacting, mechanical parts, nor does it use a ribbon or ink pump, the vendor said. A disposable ink cartridge supplies ink to the print head using a pressure regulation system that flows enough ink to the print head to replenish ink that is jetted on an electrical pulse from each of seven independently controlled ink chambers.

A microprocessor controls communications between the processor and the printer as well as all printer functions. This makes it possible to interface with most operating systems, the vendor said.

Customer deliveries are scheduled to begin in June. The AJ650 costs $3,500 or $150/mo on a 12-mo lease, the vendor said from 521 Charcot Ave., San Jose, Calif. 95131.

Transport Designed To Stream

MINNEAPOLIS — Control Data Corp. has announced a magnetic tape transport that uses data streaming techniques. The transport can be used on CDC and other vendors' systems.

Called the CDC 92180, the unit is the first in a planned family of CDC streaming tape units. It was designed as a backup device for medium-capacity fixed disk drives. It can also be used as a general-purpose tape transport for applications such as transaction data processing, the company said.

Reel-to-Reel Transport

The CDC 92180 is a formatted, reel-to-reel transport that uses .5-in. magnetic tape with a density of 1,600 bit/in. Information is recorded and read in nine-track phase-encoded format at a speed of 100 in./sec when operated as a streaming device; and 12.5 in./sec in a start/stop mode, the vendor said.

Design of the CDC 92180 tape transport incorporates a short 13-in. tape path, air bearings and distributed edge guides. The unit comes with built-in diagnostic capabilities. In addition, the device was designed so that operators perform routine maintenance functions, CDC said.

Prices start at $2,760, the vendor said from 8100 S. 34 Ave., Minneapolis, Minn. 55440.

Syfa Gets Disk Cache

LAS VEGAS — The Commercial Systems Division of Computer Automation, Inc. has announced a disk cache that connects to the firm's Syfa distributed data processing system and reportedly reduces disk access times from a typical 40 msec to about 4 msec.

The disk cache is geared to supplement CA's 32M-, 80M- or 300M-byte disk drives that attach to the Syfa system.

The disk cache costs $30,000, not including a disk drive, the vendor said from 2181 Dupont Drive, Irvine, Calif. 92713.

'It's a Good Sermon, But I Suggest Fewer Statistics and More Social Comment.'

Mini Bits

Array Processor Introduced For DG Nova, Eclipse Units

NEWTON, Mass. — Computer Design and Applications, Inc., has announced an array processor, the MSP-2X, for Data General Corp. minicomputers.

Contained in one 15-in. square circuit board, the MSP-2X plugs directly into an I/O slot of a Nova or Eclipse processor. The MSP-2X performs signal analysis operations at 20-to 50 times the speed of the host alone, the vendor said.

The array processor employs a 24-bit mantissa and an 8 -bit exponent in a block floating-point format.

The unit includes a 2K by 24-bit high-speed data memory and an on-board memory table of trigonometric functions.

The unit costs $5,950, the vendor said from 377 Elliot St., Newton, Mass. 02164.

Processor Uses Floppy Disks, Micro As Workstation Cluster

ALEXANDRIA, Va. — Datatel Minicomputer Co. has announced The Solution Word Processor that uses a microprocessor and two floppy disk drives as the heart of an administrative workstation cluster.

Each word processor can be interfaced with any Honeywell, Inc. Level 6 Ultimate, Applied Digital Data Systems, Inc. Mentor, Prime Computer, Inc. Information or Microdata Corp. Reality systems.

The system is compatible with the firm's CP/M-based operating system.

The Solution can be configured with one word processing station or it can be expanded to include up to three terminals and 10M bytes of fixed disk storage.

The system costs $12,900, the vendor said from 3700 Mt. Vernon Ave., Alexandria, Va. 22305.

High-Speed Printwheel Printers Designed for IBM Displaywriter

FRANKLIN LAKES, N.J. — IBM's Office Products Division has announced that the firm is now shipping high-speed printwheel printers for IBM Displaywriter systems.

Three printers, including two high-speed models, are now available to produce high-quality documents on Displaywriter.

On any of the printers, one document can be printed on a given printer while an operator works on another, and one part of a document can be printed while an operator works on another segment, IBM said.

The IBM printers are available in 40- and 60 char./sec versions. The 40 char./sec printer costs $3,895 and the 60 char./sec printer costs $4,275.

Early Reports on Apple III Describe Micro as Lemon

By Tom Henkel
CW Staff

CUPERTINO, Calif. — The old line about one bad apple spoiling the whole bunch may not be true for Apple Computer, Inc., but its latest processor has created a bushel of headaches for the innovative firm.

Early users of the Apple III have compiled a long list of complaints about the system, and Apple is scrambling to solve the problems before the glowing reputation of the Apple II is tarnished.

The Apple III has been plagued with problems since its announcement last May. Industry analysts say the problems involve just about every facet of the system. There are software problems on existing programs, and other programs — the ones that Apple promised would make the Apple III better than its predecessor, the Apple II — haven't been announced.

Initial users of the problem-plagued system report instances of loose chip sockets that caused chips to slip out during shipment; a faulty clock/calendar chip that forced Apple to offer a $50 rebate on its first 1,000 installed Apple IIIs; problems in attaching circuit boards; a less-than-adequate cooling system; hard disk problems; and a host of other mechanical problems, according to industry analysts.

Even Apple's president, A.C. Markkula, admits the first 1,000 processors have proved to be less-than-fruitful machines. But Apple insists it has been feverishly testing the Apple III and has worked enough bugs out of the system to make the first volume deliveries — although months behind schedule.

According to one Apple dealer, who asked not to be identified, Apple is making volume deliveries, and the latest crop of Apple IIIs seem to work much better than the originals. But when the dealer was asked whether there are as many complaints on the latest Apple III shipment, he declined comment.

One prospective Apple III user, who owns and sings the praises of an Apple II, said he was ready to buy the newer Apple III, but he could not find anyone that had a good word for it.

The user said he saw the processor demonstrated on several occasions, and had a series of discussions with contacts within Apple, and "no one had anything good to say," the user said.

But Apple has made an effort to solve the technical problems with the Apple III. Part of this effort has been the dismissal of most employees involved with the Apple III project, including the project director Thomas Whitney. In all, one industry analyst said about 40 Apple employees involved with the project have been let go.

There's also talk of scrapping the Apple III project for a new processor, the Apple IV. Apple was unavailable for comment on that rumor.

High-Speed Storage Units Offered for VAX-11/780

MAYNARD, Mass. — Digital Equipment Corp. has announced two high-speed, high-density storage peripherals for its VAX-11/780 processor.

The RP07 fixed-media disk drive offers 516M bytes of storage, and the TU78 tape drive can store up to 145M bytes per reel. The disk uses Winchester technology and has a standard transfer rate of 1.3M byte-/sec. It offers an optional peak rate of 2.2M byte/sec and is supported under the VAX/VMS operating system.

The RP07 employs nine platters in a sealed recording environment. Four heads per recording arm and two arms per recording surface are used. The disk bit density is 11,139 bit/in. and the track density is 537 track/in. The unit has an average seek time of 23 msec and an average access time of 31.3 msec, the vendor said.

The RP07, consisting of a disk drive and controller costs $48,000. Up to seven disk drives can be attached to a single controller. The drives alone cost $38,000 each.

The TU78 uses group coded recording (GCR) and phase encoding (PE) techniques. The unit also features dual-density recording in the industry-compatible Ansi standard. Data reels can be transfered between VAX-11/780 systems and those from other manufacturers, DEC said.

The TU78 has a peak transfer rate of 781K byte/sec in a GCR mode. The GCR mode yields a three-to-one capacity improvement over PE recording. Recording density of GCR is 6,250 bit/in. and the read/write speed of the TU78 is 125 in./sec.

The TU78 including a controller and formatter costs $52,000. Additional drives cost $25,500, the vendor said.

DEC is located at 146 Main St., Maynard, Mass. 01754.

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Desktop System Uses Hard Disk

HORSHAM, Pa. — Digilog Business Systems, Inc. has announced a business computer system that integrates 5M bytes of hard disk storage into a Z80-based desktop processor.

The System 1500 includes a 24-line by 80-col. CRT, keyboard, Z80A-based processor and a floppy disk backup drive.

The unit also features a 5M-byte Winchester disk drive and 64K bytes of random-access memory (RAM). The CP/M operating system and accounting and word processing applications are also available without additional programming, the vendor said.

A basic configuration including 32K bytes of RAM, a 5M-byte Winchester disk drive, a 700K-byte minidiskette drive, a Z80A processor, a 12-in. CRT display, an RS-232 serial communications I/O port, a parallel printer interface, an S-100 bus adapter and CP/M operating system costs $9,995.

Options include 16K bytes of additional memory, $215, an auxiliary RS-232 I/O port, $350, and a dual-auxiliary RS-232 I/O port, $450, the vendor said from Babylon Road, Horsham, Pa. 19044.

Southern Systems Unveils Redundant Printing System

FORT LAUDERDALE, Fla. — Southern Systems, Inc. is offering a redundant printer system designed for users requiring zero printer downtime.

The PS-10 consists of a primary printer, a lower speed backup printer and a switching mechanism. The switching mechanism can reportedly be connected with the host processor and two printers with either parallel or serial interfacing.

Southern Systems offers various combinations of speeds in the dual-printer systems. For example, a user with a 1,500 line/min printer may install a 900 line/min backup, while a 900 line/min printer user may install a 200 line/min printer, the vendor said.

The Southern Systems backup system is available for Digital Equipment Corp., Data General Corp., Hewlett-Packard Co., Texas Instruments, Inc. and Interdata, Inc. systems, the vendor said.

Systems cost between $6,000 and $55,000 from the vendor at 201 N. Federal Highway, Deerfield Beach, Fla. 33441.

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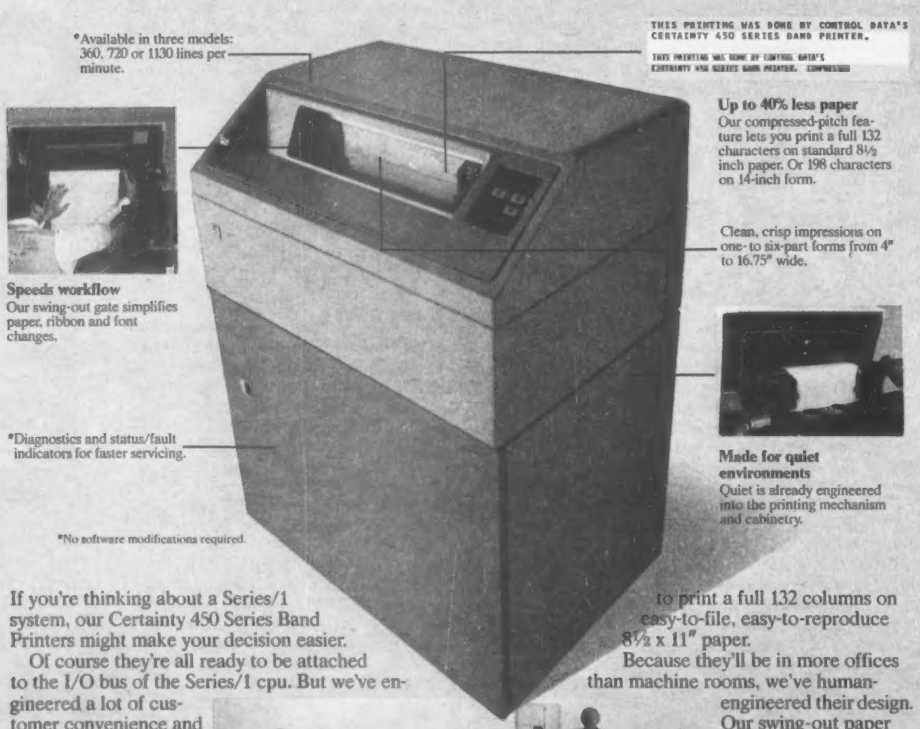

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Centronics Offers Band Printer In Two Versions

HUDSON, N.H. — A 600 line/min band printer subsystem said to be plug-compatible with systems made by Digital Equipment Corp., Data General Corp. and IBM has been announced by Centronics Data Computer Corp.

The LP Series printers are available in two versions, a standard pedestal-mounted unit with open paper path and a totally enclosed version to provide office environments with a noise level less than 60 dbA, the vendor said.

The series offers an operator-controlled self-test capability that is switch-actuatated at the printer and a choice of 48-, 64-, 96- and 128-char. set bands, the company said.

The LP Series printers are priced from $7,525 to $10,400, depending on the system used, from Centronics Data Computer Corp., Hudson, N.H. 03051.

Add-In Card Fits DEC Units

SANTA CLARA, Calif. — National Semiconductor Corp. has announced a 256K-byte, board-level, add-in memory card that plugs directly into the Digital Equipment Corp. VAX-11/750 and PDP-11/70 MK-11 MOS memory backplane.

The NS 70/75 is fully interchangeable between the PDP-11/70 and the VAX-11/750 without modification, the vendor claimed. The card can be electrically removed from the backplane via an on-line/off-line switch to allow easier maintenance and diagnostics.

The add-in memory costs $2,250 from the vendor at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

As Application Tools Proliferate

New Track Urged for Software Vendors

By Marcia Blumenthal
CW Staff

NEW ORLEANS — As management information system (MIS) departments engage in more long-range planning and as hardware vendors, led by IBM, step up introduction of application development tools, independent software vendors are going to have to change the way they market their products.

That challenge was delivered by Chester R. Mills, president of Marketing and Sales Support, Inc., at the Association of Data Processing Service Organizations, Inc.'s (Adapso) 54th management conference held here late last month.

CW At Adapso

MIS departments no longer go through a gradual process of automation — from implementing the simplest accounting applications to a far-flung distributed processing system. Rather, the velocity of movement in MIS environments is enormous. Users are demanding very early on sophisticated products that can meet their long-term needs, said Mills, who runs a Dallas-based market research and consulting firm. The real-time environment is going to be a way of life, and most DP managers know with real-time systems better planning is necessary.

Users are increasingly taking a long-range view of the DP environments they eventually want in place in their organizations. "Buyers today are much more aware of the software they want and the DP organization that has to be in place to support that environment," Mills maintained. While in the past an organization may have taken seven to eight years to evolve, today's MIS environment can change drastically in two to three years. Mills noted users often go from a DOS to an OS environment in 24 months.

In the past independent software companies have introduced application development products and "enhanced the hell out of them," Mills noted. But that strategy will not work in today's MIS environ-

(Continued on Page 86)

Informatics Making Plans To Offer Hardware

By Robert Batt
CW West Coast Bureau

BEVERLY HILLS, Calif. — Informatics, Inc., the Los Angeles-based software and systems house, will enter the hardware market, senior executives reported here at the company's annual general meeting.

Walter F. Bauer, Informatics chairman, said the company expects to increase its involvement in hardware/software solutions from a current 1% of total revenues to 30% to 40% by the end of the decade.

"There has been a rapid move of late to hardware/software solutions," Bauer said. "There is a strong user demand for end solutions and people want to buy hardware along with the software. As a result, part of the research and development commitment Informatics is making is integrating hardware with software, a reversal of the traditional role for many firms in the computer industry."

While Informatics would not manufacture hardware equipment itself, Bauer said the company would probably buy major components — peripherals such as floppy disk and printers, assemble them and integrate them into turnkey systems.

"There is a going trend for software and services firms to sell hardware with their program and remote computing capabilities. This is largely the result of the increasing use of mini- and microcomputers and a growing tendency for users to apply their lower cost systems to special dedicated applications. We intend to buy major components from hardware manufacturers, add our software and sell it as a hardware/software solution," Bauer explained. Bauer stressed that this expanded use of minis and micros represented a major force in shifting the relationship between users and vendors. Software and services companies, because they are closer to end-user requirements, were, he claimed, better placed than hardware manufacturers to

(Continued on Page 90)

Sales to Soviet Union Drop; China Top Communist Mart

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — U.S. computer sales to the Soviet Union dropped sharply in 1980 following the technology trade restrictions imposed by then-President Carter early last year, the International Trade Commission (ITC) reported recently.

In a report to Congress last month, the ITC said China has supplanted the Soviet Union as the major market for U.S. goods and services in the communist world, primarily as a result of the trade embargo and the granting to China of "most favored nation" status.

Since the U.S. and China signed a comprehensive trade agreement in February 1980, two-way trade has more than doubled, the ITC report said, although expected large increases in Chinese orders for U.S. high-technology items have failed to materialize.

The agency noted a surge in machinery and technology exports to China in 1979 but said Chinese reevaluation of national economic goals has resulted in intensified efforts to build up the country's economic infrastructure before moving ahead with large capital outlays for western technology.

U.S. computer sales to China were small in 1980, amounting to only $29 million, but, the ITC said, the Chinese "have expressed a particular interest in computers" and sales "are likely to continue to increase despite the current retrenchment in the Chinese economy."

The ITC explained the optimistic outlook for DP sales to China by noting "the more

(Continued on Page 92)

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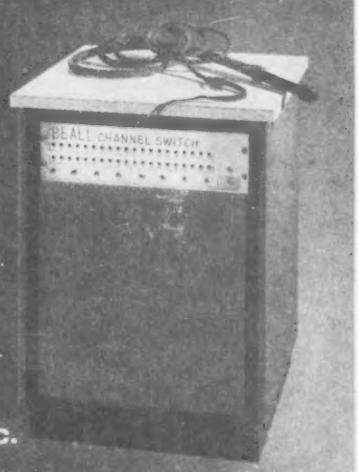

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Administration to Push Services Trade Overseas

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Reagan administration will work to further international trade by U.S. service industries, a number of which, including data processing and telecommunications, are vital to the American economy, U.S. Special Trade Representative Bill Brock said recently.

"Services trade is the frontier for expansion of export sales," Brock said in releasing a "work program" to facilitate service trade. The program was approved recently by the Cabinet-level Trade Policy Committee.

"Aggressive cultivation of foreign markets by U.S. service industries is as critical to our economic recovery as is increased export of goods," the trade representative said. Brock's office estimated service industries employ seven of every 10 working Americans and represent up to two-thirds of the U.S. gross national product.

U.S. service industry exports probably exceed $35 billion a year, Brock's staff said, even though services trade is not covered by the kinds of detailed international trade agreements that address trade in products.

Rectifying that disparity will be a major goal of the U.S. work program on trade in services, according to the program outline.

"At present, no coherent international framework exists for resolving trade problems in services," the trade representative said in an accompanying discussion paper prepared for the Organization for Economic Cooperation and Development (OECD), which has been investigating services trade problems.

"Some services are covered by bilateral agreements covering those services or by multilateral agreements providing for cooperation at the technical level," the discussion paper said.

"For the most part, however, governments must rely on bilateral contacts on a case-by-case basis to resolve individual trade problems."

Real Limitations

The paper said "there are some real limitations to what can be accomplished without a more organized negotiating process for exchanging commitments."

While "there is relatively open trade in many areas of services ... there is also a disturbing trend toward increased restrictiveness in some areas," the paper said. The document went on to note OECD work in studying the economic implications of transborder data flows.

Addressing trade barriers, the trade representative's working program said "a number of service industries are considered critical to economic, social and national security goals, and governments have traditionally felt the need to regulate these industries to assure broad societal goals.

"These goals can also be used, however, as a shield for protectionist ends, and it is a legitimate purpose of trade policy to seek to minimize such abuses," the work program said.

Explaining the U.S. program, the trade representative said "many U.S. service industries are experiencing major trade problems, both as a result of foreign barriers and as a result of U.S. policies that unduly burden U.S. exports.

"In recognition of the growing importance of U.S. trade in services and the relative lack of existing mechanisms for dealing with the trade problems in services, trade issues relating to services will be given a high priority in the administration's trade program."

The work program will consist of five components. the government said:

- Full utilization of existing bilateral channels for resolving current services trade problems. "Every effort will be made to deal with pressing current trade problems through bilateral contacts with responsible foreign officials," according to the work program.

"Where services are covered by bilateral treaties ... the government will seek full enforcement of such provisions. Where no existing provisions exist, consultants will take place in the context of the overall bilateral commercial relationship with the county concerned."

The program document added that "a more satisfactory outcome will require the negotiation of broader and more effective international agreements on trade in services."

- Inclusion of services in the review of U.S. policies that burden U.S. exports. "Some U.S. service industries have indicated that a number of U.S. government policies pose a more formidable barrier to exports than do barriers imposed by foreign governments," the program outline said.

Removing those barriers through amendments to tax, business ethics and antitrust laws and policies will receive special attention from the administration, according to the trade representative.

- Domestic and international preparation for future multilateral negotiations in trade in services. Before international agreements on services trade can be sought, an in-depth analysis of trade barriers in this sector will be necessary, the work program said. The OECD discussion paper was presented to start the analysis process.
- Review of domestic legislative provisions relating to obtaining reciprocity for U.S. services exports. The trade representative noted the work in Congress to achieve international reciprocity in communications services and said the administration will work with Congress to extend that effort to other services sectors.
- Review of the adequacy of U.S. statistics on trade in services.

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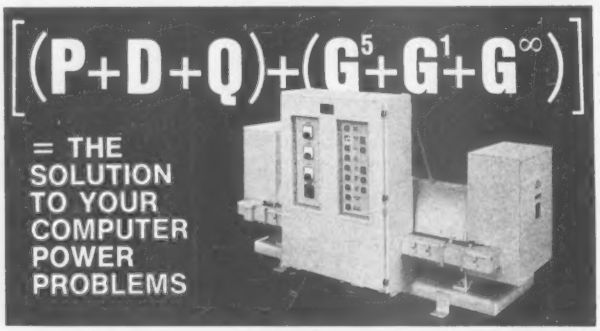

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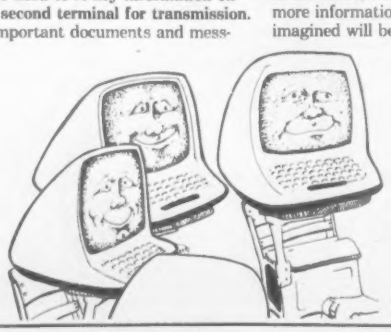

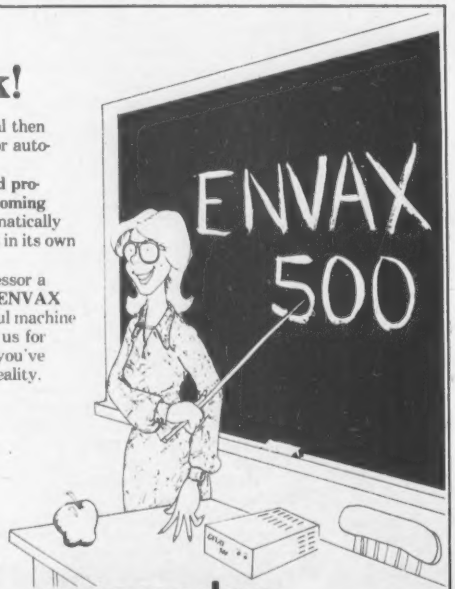

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For Second Consecutive Year

Fujitsu Outpaces IBM Japan in Japanese Sales

By Bill Laberis
CW Staff

NEW YORK — For the second consecutive year Fujitsu, Ltd. has topped IBM Japan, Ltd. in computer sales in Japan, capturing an increasing share of that country's domestic market while broadening the sales gap between Japan's two leading computer manufacturers.

Preliminary annual figures show that IBM Japan's sales grew a modest 4.3% in 1980, as the wholly owned subsidiary of IBM Corp. failed to recapture the No. 1 spot it lost to Fujitsu in 1979.

While IBM Japan's export sales grew 20.2% to 69 billion yen (about $317 million), domestic sales grew less than 1% to 270 billion yen ($1.24 billion).

On the other hand, Fujitsu's computer sales soared 16% to an estimated 380 billion yen ($1.7 billion). Although no breakdown of domestic vs. export sales was available, a company spokesman said sales in Japan "probably grew at least 10%."

Over the last five years, Fujitsu's computer sales have grown an average of more than 12%, with last year's 16% growth being the largest in the five-year period.

Still Leading

"I know IBM (Japan) still enjoys about a 28% or 29% lead in the installed computer base in Japan," Fujitsu spokesman Yuichi Kurita said. "But our sales in Japan are cutting into that [lead]. Our growth is steady and rapid."

IBM attributed its modest growth in Japanese domestic sales to a relatively high rental- or lease-to-sales ratio. The less than 1% domestic sales growth contrasts sharply with the corporation's 14.5% growth in sales worldwide last year.

"The tendency of IBM Japan's customers to rent or lease, particularly in large systems, continued in 1980," company spokesman Kenneth Sayers said. "But demand (in Japan) remains very strong, and IBM is rapidly expanding its facilities to meet that demand."

Sayers did not say whether IBM Japan would try to improve sales figures by systematically raising equipment lease prices to induce more outright computer purchases, as the parent corporation did last year in the U.S.

IBM Japan's 20% increase in export sales reflects the "tremendous economic growth rates in Southeast Asia, which are currently among the strongest in the world," he said.

Meanwhile, Japan's two other computer giants, Hitachi, Ltd. and Nippon Electric Co., are also on the heels of IBM Japan, having increased computer sales last year by 17% and 21% respectively, with each having passed the billion-dollar sales milestone in the same period.

AMF Sues CA, Alleging Bad Minis

DAYTON, Ohio — AMF, Inc., of White Plains, N.Y., is seeking $13 million in damages from Computer Automation, Inc. because of allegedly defective minicomputers, according to a suit filed in U.S. district court here.

Damages sought in the complaint are based on claims related to minicomputers shipped from Computer Automation to the AMF Electrosystems Division in Vandalia, Ohio, during 1977 and 1978.

The complaint seeks $13,700,000 in damages, including $10 million in punitive damages or, alternatively, $10 million in compensatory damages, plus counsel fees and costs.

Computer Automation President, D.H. Methvin, stated the company regards the complaint as being "wholly without merit" and that the firm will "vigorously contest" the action. Methvin declined further comment "until our attorneys have had an opportunity to review the complaint" and file a response.

Amda Elects Officer Slate

SAN DIEGO — The 1981 annual meeting of the Accounting Machine — Minicomputer Dealers Association (Amda) concluded last month with the election of officers and directors.

Elected were: Ken Wilson, chairman of the board; Bob Burgener, president; Larry Finch, first vice-president; Don Mulvey, second vice-president; Louis Love, treasurer; and Bill Ewell, executive secretary.

Directors elected to serve a three-year term were James Smith, Charles Parsons and Ray Breaux, Amda reported.

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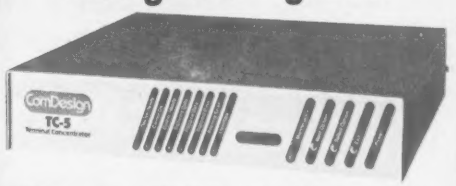

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Adapso Mum on New Position Paper on IBM

By Marcia Blumenthal
CW Staff

NEW ORLEANS — A new position paper on IBM has been approved by the Association of Data Processing Service Organizations, Inc., but the group is keeping it under wraps until it first shares it with IBM and the U.S. Justice Department.

CW at Adapso

Approval for the position paper, which rescinded previous documents in existence since 1972, was made during the organization's management conference held here recently.

"For those who have traced trends in the industry, the contents of the paper will not be surprising but will be significant," reported Jerome Dreyer, Adapso's president. Adapso intends to circulate the position paper this week.

In another move, the industry organization approved the formation of a political action committee provided for under federal election laws. This will allow the industry to escalate its visibility in government regulatory activity by permitting Adapso to make contributions to key senators and congressmen who have an interest in the software and services industry, Dreyer said.

By law, contributions to political campaigns can be made in the name of the trade association but can only be contributed by individual members of those associations.

In other business, Adapso continued its discussion of a possible merger with the Computer & Communications Industry Association. Dreyer said, however, that a decision would not be final for about a year.

Mills Urges New Track

(Continued from Page 83)

ment, he added.

Product and service strategies must be pointed to specialized markets and vendors must know what specific value they are adding to IBM's products and be able to demonstrate that value to users. IBM is now supplying tools, and last year the company introduced 207 pieces of applications development software, Mills said. This new tack shows that IBM is responding to the user's need to develop systems fast.

While IBM may not offer the best products in the marketplace, it does offer users a "warm blanket," Mills suggested, adding that other mainframers are taking the same stand as IBM.

Reaction to Views

Reaction to Mills' not-too-distant-future view of IBM's impact on the independent software market was met with outspoken opposition. There are other views of the DP environment besides IBM's. Although not denying that response, Mills said the proliferation of software offerings is creating confusion among users who are tempted to run to IBM for a blanket solution. And IBM is now intent on offering that solution, he asserted.

One attendee from National Advance Systems noted his firm had the most difficult time selling to a new IBM DOS user.

While making a strong position for IBM's increased presence in a major portion of the market in which independent software vendors have been dominant, Mills said independent vendors would be able to compete with IBM and other mainframers effectively. However, they must be able to demonstrate the value-added features of their products.

As the MIS organization has become larger, more complex and more prominent in the corporate structure, software vendors will find themselves selling to more people in the organization. One of these will be the MIS specialist, who Mills termed the "technocrat of the organization."

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Preventive Measures Advocated

Parties to Lawsuits Finding Courts Expensive

By Marcia Blumenthal
CW Staff

NEW ORLEANS — Although the number of users suing their hardware equipment and software suppliers is mounting, the parties are finding the court route lengthy and expensive, according to participants at a meeting held here recently by the Association of Data Processing Service Organizations, Inc. (Adapso).

Rather than allowing cases to drag on, some lawyers specializing in computer law are advocating not only speedier means of resolving disputes, but also preventive measures to avoid litigation altogether.

The newer methods are far more creative than the usual full-blown lawsuit, suggested Miles Gilburne, a partner in the law firm of Blanc, Gilburne, Peters, Williams and Johnston.

CW at Adapso

In the past, users have been reluctant to sue vendors because the prospect of terminating an existing relationship with a vendor was horrifying, Gilburne told executives attending the Adapso management conference. This hesitation results from the user's business being heavily structured around the computer system, he said, and until recently the marketplace did not offer a lot of realistic alternatives to the system already in place.

Today's DP managers are in a particularly vulnerable position in the organization.

(Continued on Page 88)

Arbitration Held Limited

By Marcia Blumenthal
CW Staff

NEW ORLEANS — Arbitration between a computer user and vendor is one way of avoiding time-consuming lawsuits, but its use has limited creativity.

NCR Corp. has been writing arbitration clauses into its contracts since 1976, Ben Olive, the firm's associate general counsel for commercial legal matters, noted at the recent management conference sponsored here by the Association of Data Processing Service Organizations.

Although arbitration can be a quick, inexpensive means of resolving friction between users and vendors, the arbitrator does not explain how his decision was formulated, Olive explained. Moreover, there is no chance for appeal if the arbitrator errs.

Arbitrators appointed by the American Arbitration Association (AAA) are not investigated or certified by the AAA. They merely apply to become arbitrators, presenting their credentials to the AAA.

Despite the possible drawbacks of the arbitration process, arbitrators tend to be less judgmental than juries, Olive said. The use of the technique is a way of quickly settling disputes in an inexpensive manner, he added, noting that a major cost of litigation is educating lawyers.

If an arbitration clause exists in a contract, the dispute can still be settled in court, but only if both parties agree to proceed with litigation instead of arbitration.

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Parties to Lawsuits Finding Courts Expensive

(Continued from Page 87)

They have picked the vendor and negotiated whatever contract exists and, as a result, are accountable, which gives incentive for suits, Gilburne said.

But suits can be disruptive to the firm's business. As an attorney, Gilburne said, he does not want to see litigation disappear entirely, but users and vendors would often be better off if they worked out potential legal hassles in the contract process.

Today, a great deal of "inarticulate risk" is built into DP contracts, he added. Most contracts do not address specific risks the user faces in purchasing the vendor's equipment or software. When objections to the products eventually arise, vendors often disclaim warranties on the products.

The user has a "magical view" of what the product will do, Gilburne continued. To avoid litigation, vendors should articulate the risks inherent in the product prior to contracting a sale with a user.

The vendor should also be expected to let the user know if the product will function appropriately for a particular user's business by including a detailed set of functional specifications in the contract.

For example, if users expect a terminal response time of three or four seconds and the vendor determines this is not always possible because there are too many environmental variables to guarantee such a response time, the vendor will be free from liability if he refuses to guarantee this in the contract, he said.

While ambiguity in the contract has worked to the vendor's advantage in the past, legal suits ensuing from this lack of specificity are very expensive, and creative contract writing is an attractive way of preventing lawsuits, Gilburne urged.

Consider 'Minitrial'

But what if the user and vendor are already involved in a lawsuit? In this case, they may consider trying what has become known as a "minitrial," noted attorney Ronald L. Olson, a partner in the firm of Munger, Tolles and Rickshauser.

One of the keys to the minitrial — which is really not a trial — is developing a means of getting key executives of the ligitants' firms to communicate, something they probably haven't done since the suit was filed, he continued.

The technique was originally used to settle a case involving a patent lawsuit against TRW, Inc. when it tried to enter the automatic credit-checking business, Olson said.

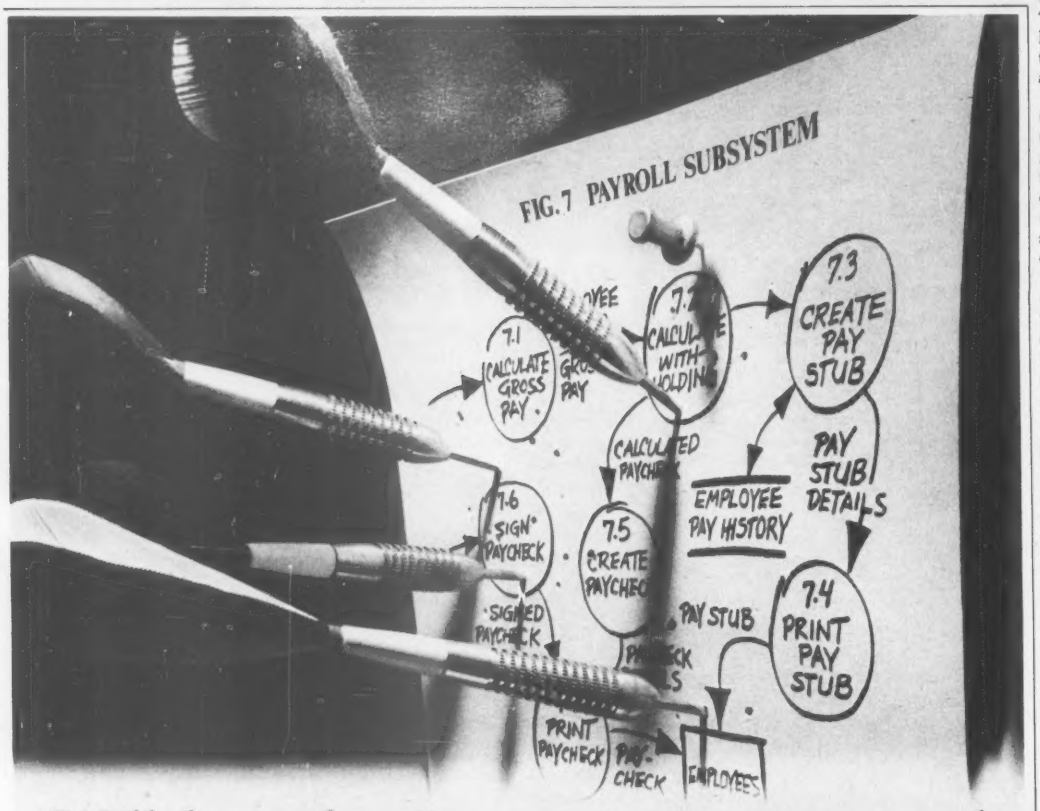
In a minitrial, the parties agree to such constraints as limiting discovery proceedings, waiving rules of evidence and using only one expert witness apiece. Critical to the process is the employment of a neutral party, according to Olson.

After the lawyers plead their case to the chief executives and the third party over a two-day period, the third party states how he feels the court would decide the case and why. The chief executives then go off to discuss the case alone.

In TRW's case, the executives reached an agreement in principle within about half an hour, Olson reported.

The minitrial technique works, he said, because the third party helps to keep the arguments focused on the merits of the case, and the chief executives bring to the proceedings their skills for assessing the risks of outcomes and of negotiating.

"Too often, lawsuits are overly litigated because corporate management walked away from the case and left problems to the lawyers," Olson said.



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Earnings Jump 48%

Wang Quarterly Revenues Up 54%

LOWELL, Mass. — Wang Laboratories, Inc.'s third fiscal quarter revenues totaled $212.3 million, a 54% increase from the $137.9 million reported for last year's third quarter.

Net earnings were $17,555,000, up 48% from the $11,883,000 reported last year; per share earnings rose from 23 cents to 32 cents.

Revenues for the nine months ending March 31 were $570.5 million, an increase of 60% from the $357.5 million reported for the similar period last year. Net earnings were $48,458,000, up 61% from the $30,060,000 reported last year; per share earnings rose from 58 cents to 86 cents.

For the four fiscal quarters ending March 31, the firm's revenues were up 62% from $466.1 million to $756.2 million. Net earnings increased from $42,302,000 to $70,511,000, a 67% increase; per share earnings rose from 83 cents to $1.26.

In April 1981, the company officially entered the "Fortune 500" list as No. 457, a position based on fiscal 1980 revenues of $543 million.

Nickels & Dimes

An eight-year convertible, subordinated, $1.2 million loan has been received by **Evolution Computer Systems Corp.** from a consortium headed by the Marwit Capital Corp. of Newport Beach, Calif. The funds will be used to increase Evolution's manufacturing inventories and services.

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Management Science America, Inc. has announced a public offering of 1.5 million shares of its common stock at $16 per share.

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Microcomputer Systems Corp. has signed a $4.5 million loan agreement with the Bank of the West to support continued growth activites.

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The board of directors of **Dicomed Corp.** have declared a three-for-two stock split in the form of a 50% dividend payable May 15 to stockholders of record on May 1.

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Bolt Beranek and Newman, Inc.'s shareholders have approved a proposal to increase the authorized stock of the company from 2.5 million shares to 6 million shares and approved a three-for-two stock split.

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Apple Computer, Inc. announced plans to file a registration statement with the Securities and Exchange Commission for a secondary offering of outstanding shares of Apple common.

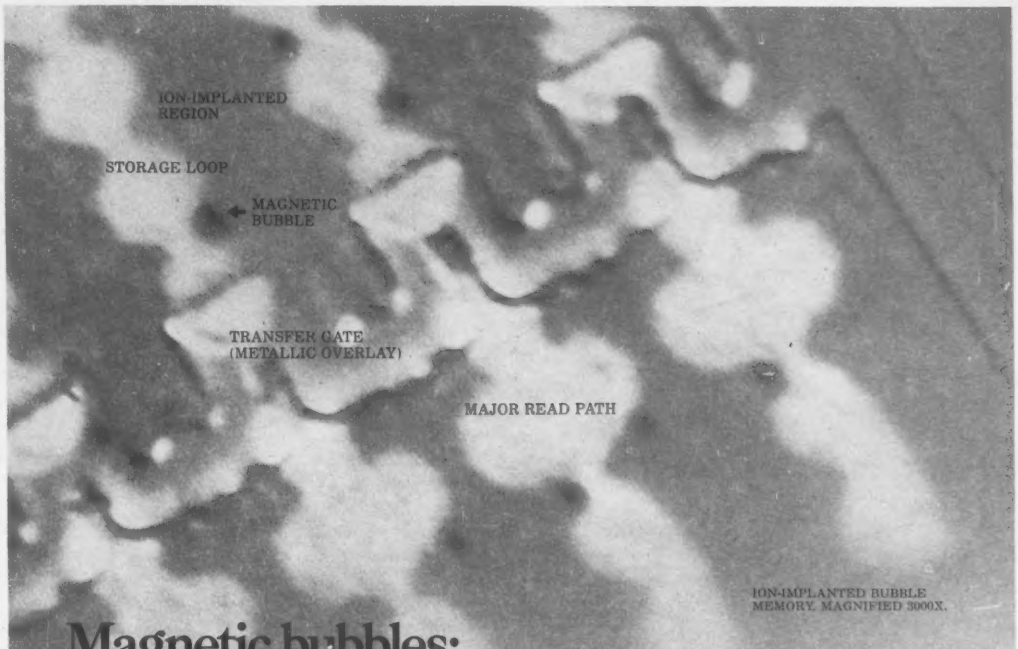
Burroughs Revamps Group

DETROIT — As part of a new marketing tack for the '80s, Burroughs Corp. has restructured its three-year-old OEM Division.

The restructuring is meant to provide greater sales and marketing support for the company's three main OEM product lines: memory products, displays and printers.

As part of the restructuring, the following personnel appointments have been made: Brian Esher, director of marketing; David Tovey, product manager of peripherals and manager of technical support; and Richard Nikiel, product manager of displays and manager of customer services.

In addition, D. Barry Donahue was named manager of national sales, and Myles Frischer was appointed manager of international sales. William McDowell's position as product manager, printers, will be expanded.



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We're also studying how to manipulate bubbles by means of two wafer-thin conducting sheets instead of a pair of external coils. With this technique, we'll be able to cut the overall size of bubble devices by a third, move the bubbles 10 times faster, and also put far more bubbles on a chip than in today's commercial devices.

A group of Bell Labs scientists and engineers working on magnetic bubble technology holds over 150 patents in the field. About half of them have been awarded to Andrew H. Bobeck, a co-holder of the basic patent for the 1966 invention. Among our inventions:

- Magnetic bubble concepts and devices
- Garnet materials for bubble devices
- Method of growing epitaxial garnet films from a supercooled solution
- Basic technology for device manufacture
- Ion implant method of propagating bubbles
- Dual-conductor sheet method of propagating bubbles

In the Bell System, bubble memories are already at work in equipment that provides recorded voice announcements and in systems that administer and test digital networks. Eventually, the memories could be used in electronic switching systems, and in advanced home and business telephones.

Our goal is to make this technology even more economical and versatile for storing data electronically. Ultimately—through our partnership with AT&T, Western Electric and the Bell telephone companies—this translates into better service to Bell System customers.

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Informatics Making Plans to Offer Hardware

(Continued from Page 83)

translate those requirements into complementary software and hardware offerings.

"Software, not hardware, is the key element in differentiating between various computer systems. Users want to know their supplier really understands their industry. Programs are increasingly oriented towards certain industries and the user wants the software tailored to his specific applications," he said.

Bauer cited several ways in which Informatics was attempting to snatch a bigger share of this growing market. Among these was a research and development plan aimed at mini and micro systems.

Informatics, he said, was especially interested in the concept of using micros as workstations to help get information into and out of large computers. To this end the company was currently testing a workstation, known as Informaticom II, to be used in conjunction with the company's Mark IV product for batch processing.

"We think there is going to be a very big market in workstations. We will sell more software products if we have a workstation to accompany them, and we believe this project is one of the first entries into this area," he added.

The company said it was also interested in acquiring companies with specialist industry applications to take advantage of the growing need for total systems solutions. Accordingly, its recent acquisition of Transportation Computing Sciences Corp. and its principal subsidiary, Computer On-line Systems, was a portent of things to come.

Bauer said Informatics' stated intention to acquire Professional Software Systems (PSS) of Phoenix was also very important. PSS supplies minicomputer-based turnkey systems for financial and administrative processing in law firms. "We believe PSS can become the leading supplier for law firm data processing in the U.S.," he said.

Informatics said it also planned to take some of its proprietary software and put it into hardware as chips to produce greater efficiency. This it was now doing with Taps —- a newly acquired microcomputer product for screen and data base software.

But despite these innovations, Informatics, the country's sixth largest independent services company, said it had not yet achieved full profitability.

Slow Climb

First-quarter profits climbed only slowly to reach $.46 million, compared with $.41 million in the equivalent period last year. Revenues in the first quarter were $30.9 million, a 6.7% increase over 1980.

Bauer predicted the revenue and profit weakness would continue in the second quarter before picking up later in the year.

The goal was to establish 10% to 15% profit margins in the software and information processing areas of the company and an 8% to 12% margin in professional services. Currently the company is only breaking even in software.

Bauer said that the dissappointing profit figures were due, in large part, to pressure applied by the Reagan administration on federal government agencies to curtail their spending.

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Orders & Installations

Docutel Corp. has been awarded a contract by People's Savings Bank of Bridgeport, Conn., for 10 of the company's Total Teller 2300 model automated teller machines.

Computer Sciences Corp. has received a $4.1 million contract to supply the communications system for a three-station extension of Atlanta's new rapid transit system. The contract from the Metropolitan Atlanta Rapid Transit Authority calls for the company to design, furnish and install the system.

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- Manufacturing
- Mathematics and statistics
- Media (publishing, broadcasting, etc.)
- Medical and health care
- Payroll and personnel
- Programming language processors
- Programming aids
- Sales and distribution
- System programs
- Transportation
- Utility programs
- Word processing and text editing
- Miscellaneous products

Product Name Index
Organized by the full name of each software product and also by abbreviations or acronyms, this index points you quickly to the proper page in the software profile section of the service.

Vendor/Product Index
This index is organized by vendor name. It associates each product profiled in the service with the vendor's name and directs the user to either the product profile page or the vendor profile page, depending on the user's need.

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  - Features • Advantages
  - Key Reports Generated
  - Industry Suitability
- Host computer systems supported
- Required operating environment
  - Minimum and recommended main memory size
  - Auxiliary storage requirements
  - Operating system requirements (including version number)
  - Plus other requirements such as previously installed packages, special peripheral devices, etc.
- Operating mode
  - Local batch • Remote batch
  - Real-time transaction-based
  - Interactive...and more
- Source language name and availability
- Number of programs in package
- Ownership options
  - Purchase • Lease
  - Rent • License
- Pricing and usage details
  - Precise and detailed terms — dollar, usage or time-related terms
  - Special terms, including pricing for additional installations
- Maintenance availability
  - If different from marketing company, the name, address and telephone number are listed
- Maintenance provisions and pricing
- Optional features and prices
- Custom package modifications (pricing and availability)
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CW 51181

China Now Major Communist Market for U.S.

(Continued from Page 83)

liberal criteria that now apply in granting U.S. licenses to export high-technology goods to China did not become effective until July 1980."

Turning to U.S.-Soviet trade, the ITC reported total American exports declined from $3.6 billion in 1979 to $1.5 billion in 1980, a 58% decrease. Most of the remaining sales were in agricultural commodities, the agency said.

Computer sales in 1980 to the Soviet Union were valued at only $400,000, a striking downturn from the 1979 figure of $22.6 million, according to the ITC statistics. Until last year, such sales had shown a steady increase every year since the Nixon administration began U.S. emphasis on detente between the two countries.

Carter imposed the trade ban last January following the Soviet invasion of Afghanistan. Although the concurrent grain embargo was recently lifted by the Reagan administration, high-technology trade is still severely restricted.

"Business contacts between U.S. companies and Soviet officials have largely been maintained," the ITC noted, "but uncertainty about the trade policy of both governments depressed business activity. It was reported in May that the overall workload of U.S. firms in Moscow had fallen by some 50%."

In a further discussion of the trade restrictions' impact, the ITC said "an increase in Soviet imports from the industrial West during the year [1980] suggests that Western technology continued to be available to the Soviets and that an undetermined amount of U.S. business has been diverted to West Germany, France and other developed countries."

The restrictions on transfer of important technology to the Soviet Union "caused some disruption in Soviet programs" and "introduced uncertainties" in Soviet economic planning, the ITC added.

The agency also noted U.S. exporters have complained of "inconsistencies" in the government's export license administration. "The entire subject is presently under consideration by the new administration as part of a comprehensive review of the U.S. position concerning the trade sanctions," the ITC report said.

"I (for once) was speechless."

-- Dave Mallery, March, 1981 issue of RSTS PROFESSIONAL

To tell the truth, so are we. We knew DISKIT would amaze RSTS users, but, frankly, we were unprepared for the response. Phone calls, letters, and now the RSTS PROFESSIONAL -- all saying what we want you to know:

DISKIT is a remarkable software tool!

Listen to what else Dave has to say:

"...using DISKIT, I created 130 accounts and fully extended their centered UFDs in 3 minutes and 40 seconds (a job that used to take 4 to 8 hours.)"

"I then copied the full contents of a 300 MB RM05 equivalent to this new 'well-structured' disk in 45 minutes, optimizing clustersize and contiguity in the process..."

DISKIT IS A DISK STRUCTURING UTILITY

As Dave discovered, DISKIT's disk structuring utility, DSU, is fast. It also:

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- Places and pre-extends UFDs
- Performs transfers between unlike disks
- Saves all accounting data
- Allows manual file placement
- Provides full logging and statistics
- Includes sophisticated error handling and recovery

DISKIT IS A DIRECTORY PROGRAM

But DISKIT is more than a disk structuring utility. DISKIT's Macro-11 directory program, DIR, displays directories 12 times faster than before -- looking up files by name, extension, and date (with wildcards) at the incredible rate of 250 files/second.

And DIR is smart. It supports all standard DIRECT switches (including backwards, up to 1,000 files) with features you won't find elsewhere - like password lookup, UFD placement, and UFD size.

DIR even works as a diagnostic tool on dismounted disks, detecting bad directory structures and identifying them with comprehensive error messages.

DISKIT IS AN OPEN FILES DISPLAY PROGRAM

DISKIT's Macro-11 OPEN program displays open files by job -- with complete job and file statistics. It even has a "sleep switch", allowing you to dynamically update information at any desired interval.

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The DISKIT package provides all the tools and utilities you need to create and manage a well-structured disk. The entire DISKIT package, with extensive documentation is available now for only $1250.

DISKIT, Dave says, "...is the 'final solution' to structured disks, eliminating all of the time and complexity and reducing the job to one of a SAVRES."

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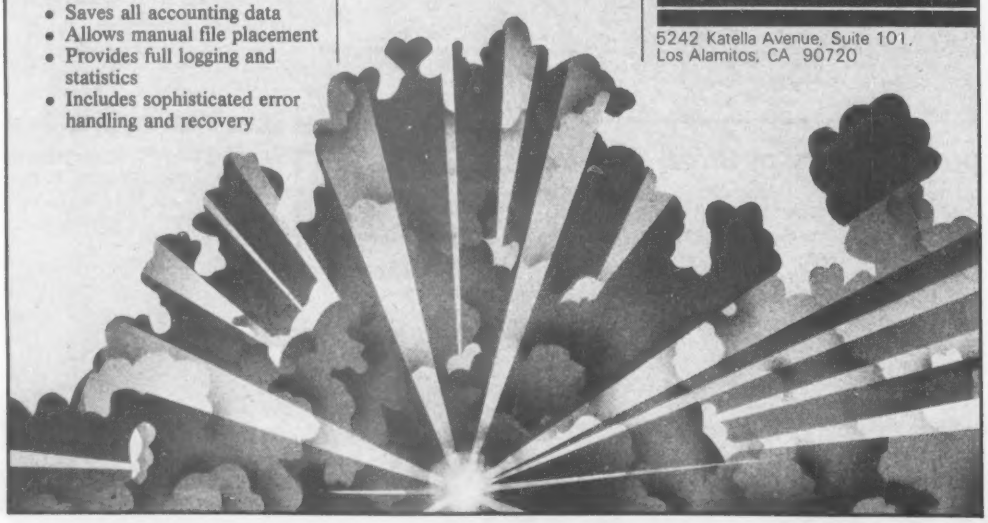

Contracts

Kennedy Co., Monrovia, Calif., has received several contracts from firms in India, West Germany and England for Winchester disk drives and backup transports. D.C.M. Dataproducts, New Dehli, India, purchased Kennedy's Model 5305, 70M-byte Winchester disk drives along with models 9100 and 9700 .5-in. tape transports. EWH Elektronik, GmbH of Hamburg, West Germany, has ordered Kennedy's Model 5305 disk drives to be used in its add-on disk systems for the PDP-11 market. Micro Consultants, Ltd., Carterham, England, has purchased Model 5305 Winchester drives and Model 6450 cartridge tape transport systems.

AT&T's Purchased Products Division and Tri-Data have signed a contract that provides an alternative for all Bell operating companies to purchase Tri-Data's telecommunications storage unit.

Northern Telecom, Inc., Electronic Office Systems and RCMC (Europe), B.V., have signed a four-year contract for marketing Northern Telecom distributed data processing products in markets including Europe and North Africa.

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'No Red Tape'

Singapore Eager for International Suppliers

By Hal Glatzer
Special to CW

Singapore wants to be a "global city" of "top-class telecommunications services, software and manpower resources," according to Frank Y.C. Yung, chairman of the city's telecommunications authority (Telecoms).

Yung said that Singapore has invited "international suppliers who are well placed" to become partners in development projects "with no red tape" that will make the strategic Asian city-state a "shop window" for marketing.

"Singapore is a business-oriented community," he said in a recent interview. S.M. Sung, Telecoms' director of corporate planning, said that France's CIT, Japan's Nippon Electric Co. and Fujitsu, Ltd. and other transnational corporations are among the manufacturers Singapore has "spoken with" about such joint projects as an electronically erasable paper, which could hasten the acceptance of videotex, facsimile and computer graphics.

But not all Asian, Pacific basin or Latin American nations are as prepared to leap into an international electronic future. Singapore is already a cosmopolitan seaport sheltering banks and other gigantic institutions whose need for transborder data flow and other services collectively called informatics is unquestioned.

Across the China Sea in the Philippines, "We want the multinational corporations to generate money for our own further development," Nestor A. Virata, vice-president for corporate planning in the Philippines Long Distance Telephone Co., said. He added that only "new construction outside Manila will decongest and control pollution" in the capital city.

Connecting new towns, he said, will require microwave networks and satellite earth stations built to withstand the island's frequent typhoons. Fewer than two telephones serve each 100 people, he admitted, noting that the urban average is higher and "sufficient for international needs," but better domestic service — especially direct distance dialing — will require computerized switching from a central facility.

With government subsidies, that facility will serve as a data network, too, "connecting political leaders" and "monitoring the progress of our roads and other development projects."

Chilean Net

Chile, a long, narrow country whose population clusters in the middle, sees tradeoffs against transportation. "It is the best way we can reduce the physical distance along the 4,000 kilometers of the country and seaward to Easter Island," said Julio Polloni, undersecretary of telecommunications. With the "most modern technology possible," Chile will complete a network based on terrestrial microwave towers down the continent and into the fragmented islands of the South, and with high frequency (HF) radio to reach into the Pacific. "Our goal is to bring the average telephone penetration up from two to 13 per 100 people, and to offer direct distance dialing from 12, instead of four cities," Polloni said.

The Cook Islands hold the distinction of having the greatest sea-to-land ratio of any nation on earth. Fifteen islands totaling barely 200 square kilometers dot the southern Pacific; half of their 20,000 people live on only one 17-kilometer island, and nearly as many more of their countrymen live thousands of miles away in New Zealand. A cable connects the two countries.

Stuart Kingan, his government's science adviser, said flatly that only HF radio can reach all the islands, no two of which are within sight of each other. "The government developed HF links free of charge to the public, powered by solar cells that have paid for themselves in less than one year, compared to gasoline generators, and also provide fluorescent lighting," he said.

"The common carriers and telecommunications authorities don't like it, but I don't think we've done them out of any money. You have to value communications by what it achieves, not by what it costs," he added.

Peacesat, the free use of the National Aeronautics and Space Administration's 14-year-old ATS-1 satellite (eight years beyond its design life!), gave the Cook Islands a model for its HF network traffic: medical services, agricultural information, continuing education and trade reports. "Telecommunication pays in

(Continued on Page 98)

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CW 0511

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Supershorts

Japan Air Lines (JAL) and American Airlines (AA) have signed a reciprocal cohost agreement to integrate AA's Sabre and JAL's Jalcom III computer reservation systems, which will provide expanded and more efficient access to the services of both.

— — —

Xerox Corp. recently opened its first West Coast office product store for small businesses and professional offices in Los Angeles.

— — —

Intech Systems Private Ltd. of India now has a U.S. representative for its organization, based in New York.

— — —

Computer Task Group, Inc. has acquired all rights to the Fleet Management System software products for the general trucking industry. Computer Task Group intends to market the system on a nationwide basis along with the Basic Four Corp. small business computer.

— — —

Lear Siegler, Inc. Data Products Division has opened its Eastern factory depot in Bensalem, Pa., to provide complete maintenance on the company's line of data terminals.

— — —

Atari, Inc. has launched a major software acquisition program for its personal computer systems. The acquisition program involves the creation of Atari Software Acquisition Program regional centers and Atari Program Exchange, a free quarterly catalog of user-written software to be distributed to Atari computer owners.

— — —

Unimation, Inc. has created a Fellow Program designed to recognize employees who have achieved outstanding records of distinguished technical achievement. Torsten Lindbom and Bruce Shimano have been appointed the first Unimation fellows. Lindbom is credited with the development of Unimation's Apprentice robot and is also responsible for promoting the development of the Puma robot. Shimano is one of the prime creators of the Val robot language.

— — —

The Media Products Group of Memorex Corp. has signed a distributor agreement with Kierulff Electronics of Los Angeles to distribute Memorex computer media products nationally.

— — —

Convergent Technologies has acquired a standard patent license from Xerox Corp. for the Ethernet local-area communications network.

— — —

I.P. Sharp Associates has developed a Far East division. The company was scheduled to open offices in Singapore and Hong Kong on May 1.

— — —

Data Electronics, Inc. has delivered its 35,000th high-density digital cartridge tape drive to Onyx Systems, Inc.

— — —

Racal-Milgo, Inc. has announced the formation of Racal-Milgo New Zealand, Ltd. The company will handle the sales, installation and customer support of Racal data communications products in New Zealand.

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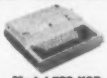
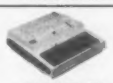
Model 743 KSR	 Model 783 KSR	Model 825 RO
Model 783 KSR*	 Model 781 RO	Model 820 KSR
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Singapore Out to Be 'Global City'

(Continued from Page 94)

many ways other than raising revenues," said Kingan.

Amateur radio, too, is encouraged. "It develops a group of technicians at little cost — people who are available, especially during emergencies. A developing country can profit considerably by it." The islands' premier is a radio amateur who keeps a transceiver on his desk so he can talk to anyone in the country any time, said Kingan, adding — in response to a question — that, yes, anyone can call the premier, too.

'Peculiar Country'

"Canada is a peculiar country," its deputy minister of communications Douglas Parkhill said, describing Canada as "a mixture of a highly developed country close to the U.S. border and a developing country in the Arctic." It was the first nation to have domestic satellite systems and was an early enthusiast for cable television, but (like Kingan) Parkhill sees the Arctic's communications future in HF radio.

"The ionosphere is free," Parkhill insisted, "and the equipment cost is low. If only a small fraction of the money from satellite development were put into HF, spectacular developments would happen."

The lessons he feels Canada has learned by being a pioneer are that "to receive is not enough; television viewers must also be producers, to have their own languages, cultures and mores respected. Even videotex needs very good-quality pictures that can serve semiliterate populations. And no single technology can do it all."

David Horton agrees. Vice-president for marketing at GTE Communications Network Systems, he warned, "Don't try to protect the old technology. Cost is so great and obsolescence is so fast, even in the U.S., that it's difficult to justify development. Sharing will stimulate world markets."

Horton said he recently spent a day explaining packet switching to representatives of a country with a government telecommunications monopoly. "They listened, and then said, 'It will kill our telex!' So I asked if they would rather lose telex to themselves or someone else. Now I hear they're putting out a bid for a packet-switching network.

"New technology," he admitted, "will happen whether you want it or not."

Glatzer is a freelance writer in Seattle.

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Cincom Systems received 14 awards–more than any other software company–at the recent International Computer Programs (ICP) awards ceremony.

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Executive Corner

• Patrick Carlin has joined Data Systems Services, Inc. as vice-president of marketing.

• Joseph J. Francesconi has been named vice-president of marketing, U.S. field operations, at Amdahl Corp.

• Hilma Mortell has been named vice-president and project manager at Informatics, Inc.

• Richard J. DiZinno has been appointed vice-president of finance at Software International Corp.

• Lee Adams has joined Western Business Computers, Inc. as vice-president of marketing.

• James C. Nitz has been appointed vice-president of industry marketing at Applicon, Inc. William T. Schaefer has been appointed vice-president of sales and Michael L. Sipsey has been named director of OEM sales.

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Video terminals are very personal devices. And many people who use them are not familiar with computers.

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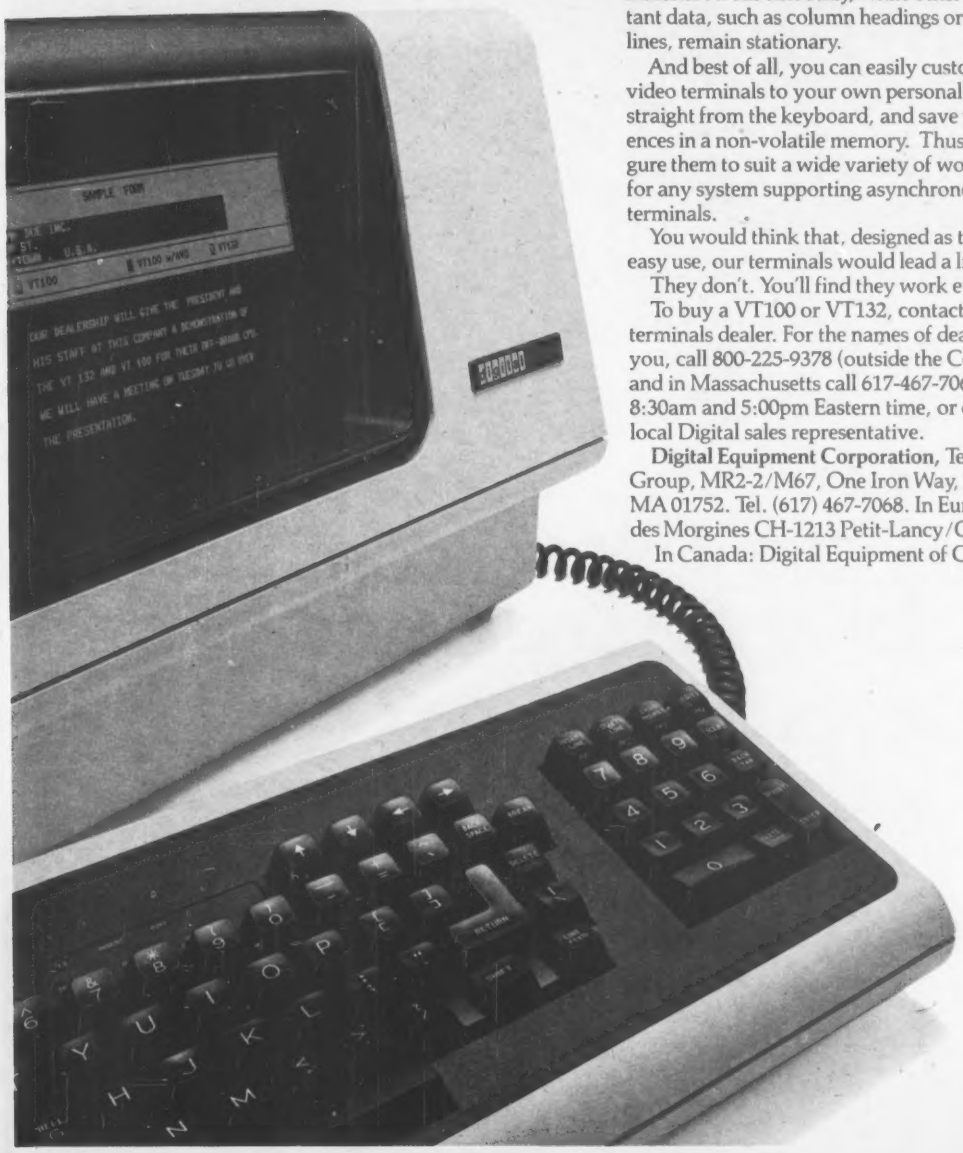
Digital Equipment Corporation, Terminals Product Group, MR2-2/M67, One Iron Way, Marlboro, MA 01752. Tel. (617) 467-7068. In Europe: 12 Av. des Morgines CH-1213 Petit-Lancy/Geneva.

In Canada: Digital Equipment of Canada, Ltd.



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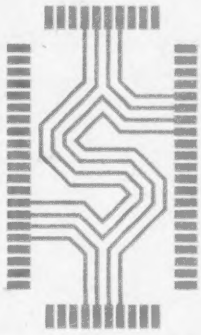

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Multi billion $ energy firm. Design exp required. IDMS/CICS/PL1. CAD exp helpful. To $38,000

PROJECT LEADER

Growth position. heavy acct'g design. Exposure to recent design methodology in a progressive shop a definite plus. CICS/IMS/ or TOTAL helpful. To $35,000

Jerre Brown
ROBERT HALF
of New Orleans
4630 One Shell Square
New Orleans, LA 70139
(504) 524-3773

ATLANTA

PROGRAMMER

Fantastic oppty with $700 M division of Fortune 100. Complete training on Systems 3,32,34,38 and 3033. Requires min 1-2 yrs RPG-II and some travel. $20,000

PROGRAMMER

Large hardboard goods manufacturer seeks min 1-2 yrs IBM COBOL. Experience with DOS/VSE and/or some CICS are helpful. Growth opportunity. $21,000

PROGRAMMER/ANALYSTS

International software firm seeks all experience levels in any of the following: COBOL, BAL, PL-1, MARK IV, IMS, CICS, PASCAL, GCOS. Fast track for relocators. $20-35,000

Charlie Wexler
ROBERT HALF
of Atlanta, Inc.
3379 Peachtree Rd. N.E.
Atlanta, GA 30326
(404) 266-2153

FORT PIERCE

NEAT III ANALYST

If you are tired of "Big City" life and yet want to live on Florida's East Coast, this is your chance! Local division of a national service bureau is seeking a NEAT III, LEVEL II Analyst with on-line experience to join its expanding staff. COBOL is a plus. Congenial work atmosphere and good benefits. Salary to $20,000

Bonnie Gouz
Chuck Neil
ROBERT HALF
of Miami, Inc.
1395 N.W. 167th St.
Suite 100
Miami, FL 33169
Dade (305) 625-5433
Broward (305) 764-1550

MIAMI

COBOL/RPG II ANALYST

Want a real opportunity? If you are eager to get ahead and have the drive to do so, team up with a South Florida division of a nationwide life insurance company. Due to the rapid expansion of the DP department new openings have been created for programmer analysts with solid foundation in RPG II and COBOL. Make it happen now! Salary to $23,000

Bonnie Gouz
Chuck Neil
ROBERT HALF
of Miami, Inc.
1395 N.W. 167th Street
Suite 100
Miami, FL 33169
Dade (305) 625-5433
Broward (305) 764-1550

FORT LAUDERDALE

MAS MANAGER

Ground floor opportunity for the self-starter who thrives on challenge! National CPA firm is in need of a technically competent EDP professional to organize its MAS dept. Marketing skills and prior National CPA firm work experience are essential. CPA certificate is a big plus. Full-range benefits are included in the many fringes offered. Salary to Low $40's

Bonnie Gouz
Chuck Neil
ROBERT HALF
of Miami, Inc.
1395 N.W. 167th Street
Suite 100
Miami, FL 33169
Dade (305) 625-5433
Broward (305) 764-1550

CHICAGO

IMS PROGRAMMER/ANALYST

Are you the best IMS-COBOL Programmer/Analyst? With 2+ yrs of analysis, design and implementation experience you can join this Blue Chip firm. Multi-303X hardware. TSO, SPF, and PL1 a plus. Call for an interview. $28,000

George Thomas
ROBERT HALF
of Chicago, Inc.
35 E. Wacker
Chicago, IL 60601
(312) 782-6930

ROBERT HALF

MILWAUKEE

SUPV TECHNICAL SUPPORT

Outstanding company needs person with OS/MVS experience. Background of installation & maintenance of operating system and large IMS network. $27-31,000

PROGRAMMER/ANALYST

Energetic candidate can do their thing by using Series 1 and EDX expertise. This is that favor you owe yourself. $26-30,000

Tom Thorstad
ROBERT HALF
of Wisconsin, Inc.
777 E. Wisconsin Avenue
Milwaukee, WI 53202
(414) 271-HALF (271-4253)

MINNEAPOLIS / ST. PAUL

PRODUCTION CONTROL MANAGER

Start up new dept. Bring together the people and the function of I/O Control. Center will include multiple IBM mainframes, running 7 days a week, 24 hour a day. To qualify for this new position, you must be a supervisor in a large OS/MVS, online, data base environment. Salary to Mid-$30's

SOFTWARE DESIGN

Unique position was recently created with nationally prominent firm based in Illinois. Join a technically advanced IBM center involved in the design of software compilers and databases. Experience with operating internals and PL/1 helpful. Client will consider new graduates w/high academic standing. Salary to $30,000

ANALYST

Large international firm running an MVS shop is looking for DP professional to be involved w/the design of new systems development and implementation. 2-3 yrs COBOL exp w/ CICS bkgd important. Work on a variety of mfg/fin'l applications. Salary Upper-$20's

Ron Dykstra
or
Kathi Grant
ROBERT HALF
of Minnesota, Inc.
2236 IDS Center
Minneapolis, MN 55402
(612) 339-9001

COLUMBUS

SYSTEMS PROGRAMMER

3+ yrs experience with Assembler and COBOL. Implementation of 4331 DOS-VS experience a plus. Responsibility for recommending hardware and systems control software and maintenance of all software. Comprehensive benefits. Salary $20-27,000

PROGRAMMER ANALYST/ PROJECT LEADER

5+ yrs accounting applications support with COBOL and IBM 370 DOS environment. Responsibilities include all financial, departmental and current applications. Comprehensive benefits. Salary $22-25,000

Kurt Hopwood
ROBERT HALF
of Columbus, Inc.
88 East Broad St.
Suite 1150
Columbus, OH 43215
(614) 221-9300

ALBUQUERQUE

PROG/ANALYSTS

Rapidly expanding financial institution has several openings for results-oriented prog/ analysts. IBM large-scale in COBOL, BAL, or CICS. Rapid promotion oppty. $18-$26,000 range

Dick Starnes
ROBERT HALF
of New Mexico
P.O. Box 3320
Albuquerque, NM 87190
(505) 884-4557

LOUISVILLE

SR PROGRAMMERS

Large Louisville corp needs several experienced programmers to enhance their manufacturing and financial systems. Excellent benefits and relocation. Salary range from Low to High $20's

EDP AUDITORS

Several openings exist in the Southeast for Programmers, Systems Analyst and Auditors with accounting degrees or accounting systems background. With 2 or more years experience you can move into a high paying and demanding position. Salaries range from Low $20's to High $30's

CONSULTANTS

There are many openings in the Midwest and Southeast for people with degrees, CPA, MBA, and experience with large and mini equipment. Sales background also beneficial. Relocation and Benefits paid. Salary range Low $20's to High 30's

Tom Williams
ROBERT HALF
of Louisville, Inc.
880 South Fourth St.
Louisville, KY 40202
(502) 585-1751

SAN ANTONIO

PROGRAMMER/ANALYST

Degree preferred, RPG II, COBOL, any hardware acceptable. Good skills with unlimited potential due to company expansion. 2 yrs+ experience is minimum. $15-20,000

SYSTEMS ANALYST

Degree is required. RPG II, COBOL of at least 5 yrs. Accounting, financial exposure is required with good communication skills. Growth/earnings potential is exceptional. NO CODING. $20-24,000

PROJECT LEADER

Degree preferred, MFG design, and system exposure a MUST. You must be able to analyze, design and coordinate staff to program, document and implement. Exceptional opportunity for the right person. $25-30,000

OPERATIONS MANAGER

Degree preferred, large company needs candidate to oversee its Computer Operation Division. Qualified candidates must have 5 yrs mgmt experience in IBM 370/3033/4331/ OS/DOS environment. People motivation is the key to this job. Financial system exp a plus. $30-35,000

Bob Baldauf
ROBERT HALF
of San Antonio, Inc.
#650 First Nat'l Bank Bldg.
San Antonio, TX 78201
(512) 736-2467

BOSTON

PL-1 SENIOR P/A

Lge state-of-the-art multi CPU OS install. Design & program on new Jevel team. Must have solid PL-1 exp. Oppty to learn CICS. Will lead to proj ldr. Salary $28,000

COBOL-NEW HAMPSHIRE

Prominent fin'l svcs firm in So NH offers low cost-of-living yet sophisticated IBM OS environments. Spend the week days programming & the weekends skiing, hiking or swimming. Salary $25,000 range

TECH WRITER

Leading software devel firm seeks articulate & creative writer to prepare software documentation & product brochures. Must be self-starter in this fast-paced co. Hi-visibility to product mgr's. Salary $23,000

MVS SYS PROG

Well recognized hi-tech mfr req. MVS internals hvy. Will take lead role in OS to MVS conversion. Must be detail-oriented, systematic & pragmatic. Suburban loc offers easy commute. Salary $34,000 range

MFG PROJECT MGR

Major consumer goods mfr seeks business-oriented mgr to direct highly skilled prog staff. Must understand proj life cycle concepts. Excellent visibility to corp & MIS mgmt in this IBM OS COBOL shop. Salary $30,000

COBOL-CENTRAL MASS

Leading fin'l svcs firm seeks P/A for proj team developing new info sys under OS/MVS. Strong COBOL skills req. CICS exp helpful. Oppty to join proj at its inception. Salary $24,000

MIS MGMT CONSULTANT

Major CPA firm seeks computer "pro" ready to take step into mgmt consulting. Must have hvy prog & design exp on a variety of bus sys. MBA pref. Will do hi-level engagements with prestigious clients. Salary $35,000 range

Gerry Battista
ROBERT HALF
of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200

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SYSTEMS/ANALYST

If you have a manufacturing background, this could be a great opportunity! Mid-South firm looking for someone to work in systems design. IBM 360, OS/MVS, HASP, JES 2, and COBOL. Financial background a plus. All fees paid by company. $21-24,000

MIS DIRECTOR

Major manufacturing holding company looking for sharp individual to be responsible for the overall operation of IBM System 34. Must be experienced in implementing new computer systems, be user oriented, and have good verbal and written communication skills. All fees paid by company. $24-28,000

ROBERT HALF
of Memphis, Inc.
825 Ridge Lake Blvd.
Memphis, TN 38119
(901) 683-5800

PROVIDENCE

DATA BASE SPECIALIST

Worldwide mfr req ldr w/IMS, DB/DC exp & solid bkgrd in analysis of batch & online apps. Exp w/mfg apps a+. Project leadership resp. Salary to $34,000

PMS LEADER

Prominent ins co seeks PMS software & OS program exp. Sys & prog dept resp w/small staff. Start up project. Salary $30,000 range

SYSTEMS ANALYST

Internat recognized co desired strong sys devel exp w/prior prog bkgrd sys devel. Methodology knowl a+. Fin'l/mfg apps exp desired. Project ldr resp. Salary $28,000

TECHNICAL SUPPORT

Maj mfr seeks sys prog to install CICS & Data Base sys. VM/ CMS 4341 DOS environ. Outstanding co benefits & growth potential. Salary $26,000 range

CICS ANALYST

Rapidly growing firm seeks exp'd prog w/CICS & strong COBOL skills. BAL a+. Good comm skills req. Lengthy user interaction. Salary $24,000

INTERACTIVE SYS PROG

Fast-track mfr w/new product devel desires sr prog/analyst w/strong COBOL & RPG II skills. MRP & mfg apps exp a+. IBM 370, Burroughs 1900 environ. Salary $24,000

Bob Lathrop
ROBERT HALF
of Providence, Inc.
400 Turks Head Bldg.
Providence, RI 02903
(401) 274-8700

ST. LOUIS

DATA PROCESSING MANAGER

Manufacturing Division of medium size, national firm located in South Eastern US seeks experienced DP mgr for IBM 4431/4341 environment. Will supervise 10-12 in design prog and operations. Must be strong mgr with some technical expertise. Computer terminal network environment. To $30,000

SYSTEM 34 MANAGER

Use your RPG II programming experience to move into mgmt position. Heavy development and design background preferred. Supervise 2-5 in med size expanding mfg shop. Evaluate new hardware and software. Exceptional opportunity. To $26,000

EDP AUDITOR

Prestigious manufacturing firm seeks experienced EDP systems auditor. Large IBM DOS/VS, and a working knowledge of COBOL required. Minimum travel to satellite plants plus excellent fringes and growth potential. To $35,000

PROGRAMMER ANALYSTS

We have several firms in St. Louis and outlying areas seeking COBOL, ASSEMBLER, and FORTRAN prog with 1 or more yrs working exp. These are growth oriented, state-of-the-art (Lg IBM, Honeywell, and Univac) economically secure companies expanding their DP dept. $19-28,000

ROBERT HALF
of St. Louis, Inc.
7733 Forsyth Blvd.
St. Louis, MO 63105
(314) 727-1535

HARTFORD

MGR INFO SVCS

Conn multi-div mfr has immed oppty for indiv to direct expansion of local/remote computing. "Mgmt svcs" consulting bkgrd pref. Some internat trvl providing internal consulting to this hardgoods mfr. Salary to $50,000

MGR NETWORK PLANNING

Conn oppty to direct expansion of lge IBM oriented network of multi-div client. Very visible & promotable pos for dynamic tech & bus oriented indiv! Salary to $40,000

DIR SYSTEMS

Expanding life div of Htfd based co seeks indiv to direct all ins sys & dev staff. Current life ins mgmt exp req for this unique top exec pos. Salary to $40,000

TECH MGR

Conn oppty for indiv to direct IBM tech staff. Exp in IBM's MVS, IMS software req. Opening due to rapid 1981 expansion. Future resp could incl Data Comm's support. Salary to $34,000

SYSTEMS ANALYST

Ins bkgrd's in life, group or casualty sys sought by expanding lge scale IBM installation. Stimulating state-of-the-art environ with strong policy of internal mgmt development. IMS, CICS or IDMS a+. Salary to $29,000

PROG ANALYST

New Conn shore oppty for savvy COBOL prog with min 2 yrs exp. This pacesetting-leader in its field (mfg) is close to beaches & major cultural centers. Gen bus apps, IBM, UNIVAC & other bkgrds considered. Salary to $26,000

OFFICE AUTOMATION

Work closely with user depts of this major diversified fin'l firm in recommending solutions & coordinating installation of word processing sys. Familiarity with IBM 3730, OS/6, 5240 & other hardware desired along with solid user contact skills. Salary to $25,000

Stan Durbas
Paul Meissner
ROBERT HALF
of Hartford, Inc.
111 Pearl Street
Hartford, CT 06103
(203) 278-7170

TULSA

SOFTWARE ANALYST

Large co is looking for persons with 1+ yrs Perkin-Elmer exp. Or 2+ yrs Assembler exp under VM, VS, or MVS. Exec ben. To $40,000

ROBERT HALF
of Oklahoma, Inc.
5840 S. Memorial Drive
Suite 217
Tulsa, OK 74145
(918) 627-1600

BUFFALO

MGR SYS DEV

Central NY mfg co needs mgr with previous line supv exp. Concentration in fin'l sys design, sys forecasting, mfg sys implem ideal. Exposure to mktg and/or admin sys a+. Med scale hardware. Top lvl mgmt pos. $35,000

MGR INFO SVCS

State-of-the-art IBM installation loc on NY/PA line. Well rounded people oriented mgr needed to supv day-to-day DP ctr + several admin services depts. Bkgrd in mfg sys design & implem + OS/VS1 are the keys. Pos rpts to fin'l exec. $38,000

SR SYSTEMS ANALYST

Straightforward sys pos for savvy bus apps analyst. Profitable div of consumer goods mfr is expanding staff. Best fit is strong bkgrd in design, prog & implem. Resp include developing new sys & updating & maintaining existing sys. Large IBM 370 shop. $29,000

ANALYST PROG

Career oriented pos for analyst with proven tech bkgrd. On-line CICS & COBOL musts; IMS & TSO helpful. Primarily resp for developing prog specs for new & existing sys in mfg, mktg & fin'l apps areas. IBM 370/168 & 3033 installation. $25,000

SYSTEMS ANALYST

Large Western NY fin'l institution needs analyst to be resp for vendor pkg evaluations & testings, design of new systems & to take charge of all sys maintenance. NEAT 3 & COBOL req. Must be able to work with little supv. Perfect opening for sr level cand. $25,000

Pam Siegal
ROBERT HALF
of Boston, Inc.
1310 Liberty Bank Bldg.
Buffalo, NY 14202
(716) 842-0401

BALT / WASH RICHMOND

SOFTWARE ADMINISTRATOR

Growing consumer goods mfg seeks a systems programmer experienced in CICS, DMS and DL1 who can develop into a manager of Systems Programming. $30,000 range

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of Baltimore, Inc.
217 The Quadrangle
Baltimore, MD 21210
(301) 323-7770

ROBERT HALF
of Washington, Inc.
7316 Wisconsin Avenue
Washington, DC 20014
(301) 652-1960

ROBERT HALF
of Richmond, Inc.
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Richmond, VA 23219
(804) 648-3677

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PARADYNE wants exceptional, innovative professionals who regard the accomplishments of today as only the first step into an enlightened tomorrow with a limitless horizon ahead...limitless both in technical and personal advancement.

SOFTWARE ENGINEERS

Software Design Engineers

BS in Electrical Engineering, Computer Science, Math or Electronic Technology. 1-3 years experience in assembly language programming required. Experience with 16 BIT mini computers and or microprocessors desired. Other high level languages, SNA SDLC, or Line Protocols a definite plus. IBM system experience also desirable. Responsibilities will include the design, development and troubleshooting of various software packages for data communication equipment and systems.

Software Customer Support Engineers

BS in Electrical Engineering, Computer Science, Math or Electronic Technology. 1-3 years experience in assembly language and cobol programming required. Experience with IBM operating systems in a large scale IBM system a definite plus. Must be able to travel and enjoy customer interface. Responsibilities include customer support and troubleshooting of data communication equipment and systems.

PRODUCTION/QUALITY ENGINEERS

Production Engineers

BSEE ET with 2 years experience in the design and development and writing of various test methods and procedures for digital and analog equipment. Familiarity with modem test and data communication equipment highly desirable. Responsibilities include the development of test methods, procedures and documents for various data communication equipment.

Quality Engineers

BSEE ME with 2 years experience in the development of systems to measure the quality level of procured material and manufactured items. Responsibilities include the definition of methods to be used by inspection personnel to assure conformance to standards.

ATE Programmers

BSET CS EE with 2 years experience in the test, test development, troubleshooting and repair of circuit board assemblies using Gen Rad 1795 or 2270 Automatic Test Equipment. Must have behavioral knowledge of TTL, CMOS and linear circuit devices. Responsibilities include the development of computer programs for various Automatic Test Equipment.

DESIGN ENGINEERS

BS MS EE with 3 to 5 years experience in digital logic design including experience in microprocessor hardware software design. Knowledge of communication protocols required. Responsibilities include design and development of key loader module, logic and software design for end to end encryption devices.

BSEE with 3 years experience with bit slice architecture and microprogramming. Knowledge of IBM mainframe environment with some communication interface desirable. Responsibilities include the design, development and support of various data communication equipment.

BSEE with at least 2 years experience of digital design TTL LS S and or processors TI 990 or 9900. Responsibilities include circuit design for various data communications equipment.

BSEE with 4 years experience in digital design. Additional experience with microprocessor at both a hardware and software interface level required. Responsibilities include the design and development and support of various developmental data communications equipment.

BS MS EE with 1-3 years experience in digital and analog design of communication and signal processing equipment and systems. Knowledge of modem operation and application helpful. Familiarity with common digital and analog IC chips required. Fundamentals of microprocessor application desirable. Responsibilities include the design and development of various data communication and signal processing equipment.

BSEE ET with 1-3 years experience in troubleshooting at system circuits and component level. Experience with the redesign or modification of digital analog circuits also required. Responsibilities include the troubleshooting and modifications of various data communication equipment and systems.

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To $25K
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CONTACT: Bob Greenberg

ROBERT HALF
OF PHILADELPHIA, INC.
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Philadelphia, PA 19103
(215) 568-4580

FT. LAUDERDALE
PROGRAMMER/ANALYST
PDP 11/70 WITH RSTS/E

Exciting career opportunity to join leading credit card registration company's growing DP dept., and enjoy South Florida living at the same time. Minimum 2 yrs. exp.; must program in Basic Plus. Public company, good benefits, salary negotiable. **Resumes: Personnel Mgr., Safe-Card Services, 2985 N. Dixie Hwy., Ft. Lauderdale, FL 33334. 305/565-2131.**

Data Processing: join the management group at Good Samaritan Hospital in Portland, Oregon...as: **Director, Information Management.**

You're needed to create and coordinate a systems approach to information management, including business applications, for the entire Hospital and Medical Center...a modern, progressive, 539-bed teaching hospital and regional medical center with an employee population of nearly 3,000.

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Your specific involvement will include developing a working philosophy for the development of an integrated, automated information processing network...establishing a systems development process to identify information processing needs...developing a data base master plan, and educating management in systems development for execution at departmental levels...setting priorities for Personnel and Capital Resource Allocation, and establishing an annual plan... and managing and evolving departmental organization and personnel.

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Good Samaritan Hospital & Medical Center

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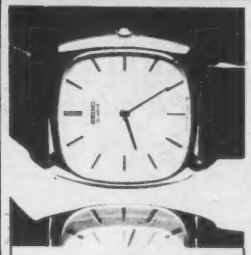
3003 North Central Ave. Suite 1706, Phoenix, Arizona 85012



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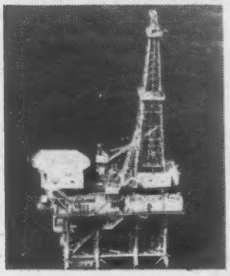
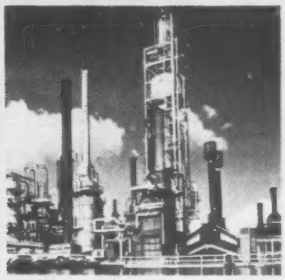
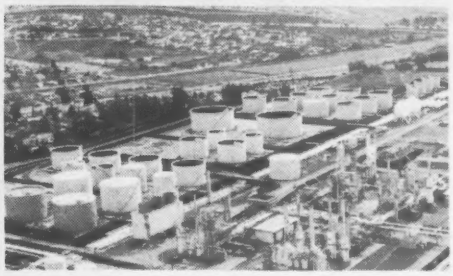
BUSINESS & TECHNICAL SYSTEMS OPPORTUNITIES







The Coastal Corporation is a broadly based, 5.1 billion dollar energy supply company operating worldwide. A position with our organization is always a challenge due to the extensive amount of responsibility that goes along with it. This philosophy combined with our outstanding growth record and the desirability of our locations should make the following opportunities extremely attractive to you.

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TECHNICAL SYSTEMS (Houston, Corpus Christi, Colorado Springs) These positions require 4+years experience.

Applied Science: Requires computer system development in oil & gas engineering analysis and scientific applications.

Systems Software Analysts: Requires a degree and experience in ADABAS and/or MVS systems.

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COMPUTER

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CSC

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Applicants must be skilled in IBM Assembly language and have a minimum of 3 years programming experience. Some data base, data communications and/or systems programming experience very desirable.

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ADR

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Qualified applicants should submit resume and salary history in complete confidence to: ANHEUSER-BUSCH COMPANIES; Corporate Employment; Department G-1-S-CW; 721 Pestalozzi; St. Louis, MO 63118. An Equal Opportunity Employer M/F.

ANHEUSER-BUSCH COMPANIES

UNIVERSITY OF VERMONT SYSTEMS ANALYST

The Office of Management Information and Computing is seeking a Systems Analyst with a BA or equivalent in a math or business related field. Applicants must have at least 5 years of data processing experience, three as a systems analyst. Experience in COBOL and IBM/DOS are required. Applicants with experience in higher education application, on-line systems and DBMS are preferred. The candidate hired will be involved in the development of applications under our integrated database. We offer an excellent benefits package. Salary, mid to high twenties, commensurate with qualifications. **Send resume and 3 professional references no later than May 15, 1981 to University of Vermont, OMIC, 238 Waterman Building, Burlington, Vermont 05405.**

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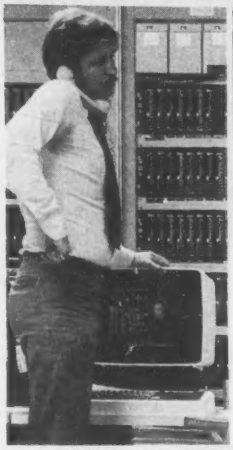

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The Administrative Computing Center is seeking an Analyst Programmer I with a Bachelor's Degree, preferably in a scientific or business related discipline. Applicants must have two to four years of experience in systems analysis and programming, two of which must be in COBOL under IBM/DOS. Applicants with experience in higher education applications, on-line systems or DBMS preferred. We offer an excellent benefits package. Salary to high teens commensurate with experience. **Send resume and 3 professional references by May 15, 1981 to University of Vermont, OMIC, 236 Waterman Building, Burlington, Vermont 05405.**

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Assistant Director Administrative Computing Search Re-opened

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A complete application consists of a cover letter and a resume describing employment experience, salary history and educational background. Candidates given final consideration will be asked to provide appropriate references.

Apply by June 19, 1981 to:
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U.W. Whitewater is an equal opportunity employer with an affirmative action plan. Women, members of minority groups and persons with disabilities are encouraged to apply.

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Define user requirements for EDP systems. Responsible for all facets of assigned project scheduling and personnel management of Systems Analysts, task members from various disciplines and outside consultants. Individual must be able to manage the activities of multiple projects and associated staff. Position requires 3 to 6 years' analytical and programming experience.

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Use independent judgement in determining training objectives, course content/organization and best media for presentations. Will develop handouts and exercises, conduct seminars and teach pilot courses on application systems and development methodologies. Responsible for preparing and maintaining systems and operations documentation and for supporting a current documentation library. Position requires 2 to 4 years' experience, a solid knowledge of systems and design concepts, and background in educational training.

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Assist the DBA with the establishment and maintenance of the Seabrook Station Data Base. Responsibilities include security controls, user training/interface, operational guidelines and integration of systems through data base design. Position requires 1 to 3 years' experience in the design and development of large data base systems. IDMS/IDD/CICS experience very desirable.

We are prepared to offer competitive starting salaries, full benefits and relocation assistance. Please send resume outlining education, experience and salary details in confidence to:

Diane Additon

PSNH PUBLIC SERVICE Company of New Hampshire

Seabrook Station
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Seabrook, NH 03874

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Qualifications: B.A., B.S. or higher degree required. Experience and broad interest in hardware and software applications in a University environment required. Demonstrated communication, managerial, and planning skills. Salary range approximately $32,700 to $46,000, depending on experience and background. Excellent benefits package.

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Vice Chancellor — Administration
4118 Administration Building
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is the position we have reserved for the

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we need now

Our ideal candidate has at least seven years COBOL experience, five as a systems analyst with two years project leader experience, and has a broad-based background. Other positives include data base knowledge, on-line transaction experience and a degree.

Our company, J and J Systems, is the data processing arm of a multi-faceted organization involved with furniture retailing, solar, oil and gas energy projects and manufacturing and distribution operations. We are a small company that offers the self-starter total project control in an on-line data base and communications environment; educational opportunities and a fast track to management. **Please submit resume with salary requirements to J and J Systems, P.O. Box 26039 Dallas, TX 75226.**

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This project leader will work with department analysts and Bank personnel in defining, analyzing and developing system specifications for all NOW-related development projects. Responsibilities would include the support and maintenance of CPCS software as well as IBM 3890 sort tables.

Experience to include working in an IBM environment and having extensive experience with COBOL and ASSEMBLER programming. Experience should also include SCI programming for IBM 3890's and CPCS software.

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EOE M/F

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WASH. D.C.

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Four states account for two-thirds of the manufacture of U.S. electronic computing equipment. Minnesota is one of them, and the Major Systems Division of Sperry Univac, with the 1100-product line, has played a key role in the growth of the Twin Cities as a major electronics center.

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I/O Design:
Design experience in I/O channels, control units, communications or related equipment is required. Experience in VLSI logic design or microprogramming is desirable.

Processor Design:
Design experience in main frame processors, logic and gate arrays or micro-coding is required. Experience in simulation and test checkout is desirable.

Advanced Degrees in both areas are desirable.

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Several top level positions in the systems design and definition of computer system products are available in the areas described below. A BS degree in Computer Science, Math, Electrical Engineering or equivalent is required plus 7 or more years of applicable experience. Advanced degrees and additional experience is desirable.

Computer Architecture experience is required in the design and implementation of computer hardware or software systems plus a detailed knowledge of series 1100 hardware and software or equivalent systems.

Performance Evaluation experience is required in computer related analysis including modeling, analytical or simulation language, capacity planning systems design, software development/evaluation or hardware design.

Software Systems Design experience is required in operating systems or data management software development or support. Desired experience includes data base administration, time sharing, transaction processing, query languages, end-user facilities and performance and modeling.

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FOR MORE INFORMATION ABOUT YOUR FUTURE WITH US, CONTACT Chris Juelich at (612) 631-5507 or mail your resume or letter of qualifications to:

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Engineering

EE/COMPUTER SCIENCE

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Requires a B.S. degree in computer science, electrical engineering, mathematics or related field, and 0-3 years programming experience to include knowledge of real-time systems and FORTRAN. Some travel required.

Submit resumes to Tri-State Generation & Transmission Assn., Inc., Personnel Department CW, P.O. Box 33695, Denver, Colorado 80233.

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TRI-STATE

COMARK

COMARK, a diversified financial services firm headquartered in Newport Beach, California has the following new positions available in our growing DP facility:

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To analyze telecommunications requirements and implement appropriate hardware, software, and network elements. Experience with CICS, BTAM, and telecommunications protocols in IBM 4331 DOS/VSE environment desired. BSCS or related degree preferred.

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To design new financial applications and modify IBM DFAS II software packages. 2 years minimum programming experience with knowledge of RPG required. COBOL exposure a plus. Prefer BSCS or MIS degree and experience on IBM System 32, 34, or 4331.

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Frank Mrachina • VP,
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The World Globe Monday, May 11, 1981

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Point-Of-Sale Programmer/Analyst

FLORIDA

Red Lobster Inns, the nation's largest full-service seafood restaurant chain, has an opening created by internal growth in our Orlando Corporate Office. The individual we seek will participate in all POS support activities including software design and development, coordination and supervision of equipment installation and evaluation of equipment/vendor performance.

WE OFFER:

- A dynamic, results oriented company
- Progressive data processing environment utilizing dual IBM 4341 processors and a POS network exceeding 1000 terminals
- Excellent salary and benefits, including profit sharing and retirement plan, medical and dental insurance and paid relocation
- Opportunity for career development and advancement

QUALIFICATIONS SHOULD INCLUDE:

- Good interpersonal skills
- Demonstrated experience developing software using COBOL and any assembler language
- Mature and self-motivated
- Exposure to systems design in a state-of-the-art environment

If you qualify, send your resume with salary history to:

Department JSC/CW-POS

Red Lobster
Inns of America
P.O. Box 13330
Orlando, Florida 32859
An Equal Opportunity and Affirmative Action Employer M/F/H/V

NCSS SYS MANAGER

Opportunity to use your total capacity. 6+ yrs DP exp including 2+ yrs COBOL programming. A/R & A/P systems design & either NOMAD, FOCUS or RAMIS. Environment is NCSS 3200. Position reports to exec VP. $35,000

SENIOR ANALYST DATABUS

Immediate challenge in this upper level position. 3+ yrs in DP with heavy DATABUS programming, systems design & good communications skills. Aid in development of financial & manufacturing applications. Highly visible with realistic, growth potential. $31,000

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212-221-6500 (agency)

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The challenge is real at **Hughes Helicopters** today, where we are moving rapidly ahead with our multi-billion dollar contracts. Record breaking demand for our products has opened new career horizons for **Management Systems/Programmers** and **Systems Analysts** to work in our state-of-the-art IBM 3031 environment, utilizing MVS/SE, CICS, TSO, DMS and IDMS.

- **Programmers**

You must possess excellent business analytical skills, be proficient in COBOL and have a good understanding of OS/JCL. 3 years' experience in a manufacturing environment would be helpful.

- **Systems Analysts**

3-5 years' experience in a large scale manufacturing environment is required. Must possess good communication skills and be able to guide programmers as well as assist users to define their needs and develop the systems to satisfy those needs.

We offer competitive salaries and a full range of company-paid benefits. Please forward your resume to **Mary Ann Dunleavy.**

Hughes Helicopters, Inc.
11940 West Jefferson Boulevard
Culver City, California 90230
Equal Opportunity Employer M/F/H
U.S. Citizenship Required

COMPUTER APPLICATIONS ENGINEERS

Cadillac Motor Car needs experienced Computer Applications Engineers in the Computer Design Group of its Product Engineering Staff. Duties will be to provide engineering resources and applications for the design, test and development of all four cadillac automobiles — Deville, Seville, El Dorado and the new Cimarron. The applications include on-line test data acquisition and reduction, design analysis and computer graphics. Will use a large network of Digital Equipment - PDP-11's and IBM mainframes.

Must have a B.S.E.E. or B.S. Computer Science and 1-3 years appropriate experience. GM offers competitive salaries and a substantial line of benefits including company paid relocation.

Send resume with salary history to

Gary Kulkis, Manager Salaried Employment
CADILLAC MOTOR CAR
A Division of General Motors
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Detroit, MI 48232
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PROGRAMMER/ANALYST

Join a small, efficient, adventurous, research team. Current and planned projects involve interactive graphics, information retrieval, natural language processing, heuristic programming, microprocessors, laboratory data acquisition, and financial simulation.

Our PDP11's, under RSX and UNIX, are dedicated to online programming using modern structured design and analysis techniques.

If you feel that you could make a significant contribution to our group, please write, describing your background and experience as well as your salary requirements to:

CW Box 2587
375 Cochituate Rd., Box 880
Framingham, MA 01701
Preference will be given to applicants with good computer science academic credentials.

Experienced Programmer Analysts

with

Financial Applications and Systems background experience
with: DOS/VSE-CICS-ICCF
IBM 4331 for Installation
Send resume with salary requirements to:

Robert A. Blackmore,
Assistant Vice President
The Schenectady Trust Company
320 State St.,
Schenectady, N.Y. 12305
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MIS PROFESSIONALS

Due to rapid growth, our clients located in N. Carolina, S. Carolina and New Orleans have immediate requirements in the following areas:

***DATA CENTER MANAGER - To $35K**
Experience in lead/managerial position; DOS/VS; CICS; COBOL and RPG II; IBM 4331; financial systems background a plus.
***SOFTWARE ENGINEERS - To $35K**
3-4 yrs. experience with IMS, CICS, NCP, TPNS and MVS internals.
***DATA BASE ANALYSTS - To $30K**
Experienced in Data Base administration or applications development in IMS.
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Background in manufacturing or financial systems, IMS or IDMS a plus.
***PROGRAMMER/ANALYSTS - To $26K**
2-3 years COBOL plus IMS experience.
***SENIOR PROGRAMMERS - To $25K**
COBOL, plus IMS
***PROGRAMMERS/ANALYSTS - To $25K**
RPG or RPG II
***CICS SYSTEMS PROGRAMMER - To $28K**
DOS/VS; COBOL and RPG II; IBM 4331; financial systems background a plus.
Client companies offer a comprehensive salary/benefit package plus relocation. Send resume in strictest confidence to:

DP STAFFING
P.O. Box 2429
New Orleans, LA 70190
504/838-8262
EMPLOYER PAID FEES

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TECHNICAL SERVICES MANAGER

We need an enthusiastic & highly motivated individual with solid data processing technical knowledge **and** strong interpersonal and communication skills to manage our Technical Services Unit.

We have a bright Technical Services team assembled, but still need a Manager to direct & develop their skills, and give the sound leadership needed to enhance the performance & utilization of our operating systems and associated software. Our current environment includes the IBM 3033 OS MVS/SE2 (going to SP), IBM 370/145, 370/158 DOS/VS, JES2, CICS, NCP, ACF/VTAM.

You should have 10 years of overall D.P. experience, with at least 3-5 years MVS systems programming experience with emphasis on performance monitoring and tuning.

Capital Holding Corporation, an insurance leader, offers career challenge and advancement in addition to excellent compensation and liberal benefit programs, including a generous relocation package to Louisville. For immediate consideration send us your current resume, or update your resume with the coupon below, and send to: **Kathy Coin, Dept. CW511, CAPITAL HOLDING CORPORATION, P.O. Box 32830, Louisville, KY 40232.**

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CAPITAL HOLDING CORPORATION

An Equal Opportunity Employer M/F

SOFTWARE ARCHITECTS

Make a career of innovation with NCR/San Diego.

Innovation is the sole charter of the NCR Systems Engineering Group at Scripps Ranch, San Diego. That makes it a highly rewarding environment for professionals who can take responsible roles in helping unify interactive and transaction processing, distributed data processing and data base management into a single, comprehensive operating system. And San Diego and its surroundings offer a broad range of housing options and living environments.

As NCR Systems Architects you will work on advanced software architecture and chart the course for our operating systems products through the 1980s. Immediate openings for the following positions:

Interactive Systems Architect
Participate in defining the architecture for advanced transactional and interactive processing systems for the 80s. Key areas: OS Kernel, performance modeling, VLSI based hardware.

Secure Operating Systems Architect
Participate in planning and specification of advanced operating systems architecture including high level interfaces, layered structuring and certifiable security.

Distributed Data Processing Architect
Participate in designing the functionality, the architecture and the protocols for distributed data processing systems.

Systems Program Manager
Function as a focal point for systems and software product development. Perform planning, coordination and monitoring through the product development.

Background should include an advanced degree in CS or equivalent and 6 or more years of system design/development experience. Salaries will be commensurate with experience and responsibilities. Benefits, including relocation assistance, are what you would expect from an expanding $3 billion computer company.

For prompt confidential consideration, please send resume and salary history to: Doug Sjoberg, Personnel Resources, Dept. F-54, NCR Corporation, Systems Engineering/Scripps Ranch, 9900 Old Grove Road, San Diego, CA 92131.

NCR
Complete Computer Systems

An equal opportunity employer

IMS SYSTEMS PROGRAMMERS

TRW Information Services, is located in Orange County, . . . one of Southern California's most desirable places to work and live. We currently have opportunities available for experienced IMS/VS systems programmers. These individuals will assume leading technical roles in the implementation of one of the nation's largest IMS DB/DC systems.

Our environment consists of multiple CPU's, MVS, VTAM and a large nation-wide private data network.

TRW ISD offers competitive salaries, company paid benefits and advancement based on job performance. For immediate consideration, call or send resume to:

Deana St. John
(714) 937-2487
505 City Parkway West, Suite 100
Orange, CA 92668

TRW INFORMATION SERVICES

Equal Opportunity Employer M/F/H

DP Manager

Rapid growth company in sunny Tucson Arizona looking for aggressive innovative self-starter to be responsible for all aspects of computer systems design, programming, operation, and documentation. Qualified individuals will have three plus years (MBS degree) experience including familiarity with Basic English retrieval language and with business/accounting programming. Knowledge of mail list processing would be helpful. Send resume and salary history to

Alpha Graphics Inc.
843 East Broadway
Tucson, Arizona 85719

We are a Fortune 100 company and one of the nation's largest agribusiness corporations. Our multi-site data centers run state-of-the-art hardware and software (3033,MVS/SP, NJE, ACF/VTAM MSNF, IMS DB/DC, CICS) to support a large terminal network throughout the Midwest. The continued growth of our Data Processing Division has created a need for the following at our Kansas City Data Center:

SENIOR IMS SYSTEMS PROGRAMMER

BS or BA degree; minimum 5 years systems programming experience in a large-scale IBM environment required. Assembler language mandatory, COBOL desirable; minimum 3 years recent IMS/DC systems programming experience. IMS internals and performance and tuning a plus. Excellent communications and leadership skills required.

Our company offers excellent employee benefits including relocation. If you are interested in making a change and would like to join a growing organization, we'd like to hear from you. Please send a detailed resume outlining your education and experience to:

COOP

Manager-Employment
FARMLAND INDUSTRIES, INC.
P.O. Box 7305
Kansas City, Mo. 64116

Equal Opportunity Employer M/F

FLORIDA IBM SYSTEM PROGRAMMERS

Florida National Banks of Florida, Inc. is converting to IBM 4300 Series Computers. A unique opportunity is afforded to those individuals with IBM OS/VS1 to MVS, CICS and JCL experience and you will be involved in planning, package selection, implementation and future support of this major conversion.

A competitive compensation package is offered that includes relocation expenses, major medical and dental insurance, stock purchase plan, paid vacation and a commitment to maintain your state-of-the-art educational requirements.

If interested please send resume including salary requirements in confidence to **Cynthia Runnion, Florida National Banks of Florida, Inc., P.O. Box 689, Jacksonville, FL 32201.**

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Management Advisory Services has been retained to find several **unique** individuals capable of working in a project team environment to develop, from scratch, a new compiler geared to IBM mainframes. This compiler will allow the client's on-line users to build and manage their own databases and financial models.

A strong preference is for individuals schooled in a computer science environment as well as having had industrial or university experience within language development, compiler development, operating systems, etc.

Salaries range from the mid-twenties to high thirties with the ability to advance monetarily without having to assume management responsibilities. An excellent benefit package is offered, in addition to very liberal relocation assistance.

Call or send resume as soon as possible to: **Alan Tarin.**

Management Advisory Services Inc.
16 New England Executive Park
Burlington, MA 01803
(617) 273-1740

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You have most likely been noticing our ads over the past couple of years and been wondering if it's all as good as it sounds. Well, now is the time to stop the speculation and give us a call to really check it all out.

Our client company can offer you the best overseas salary and benefit package going, as well as, participation in one of the premier Data Processing installations in the world.

If you have proven experience in any of the following areas, we would like to hear from you.

- ---- SYSTEMS PROGRAMMERS - MVS, VTAM, TSO and IMS
- ---- DATA BASE ANALYSTS - IMS, ADF, BTS, HDAM, HIDAM
- ---- SCIENTIFIC PROGRAMMERS - FORTRAN or PLJ
- ---- COMMERCIAL PROGRAMMERS - PL1 and COBOL
- ---- TELEPROCESSING ANALYSTS - ACF, NCP, ACF/VTAM, NOSP or NCCF

If an overseas assignment does not appeal to you, the same types of positions are available in the Houston office of this oil and gas giant.

For further information, please contact Ada Edwards, or Cliff Reilly at **(713)445-8484** or Ron Timm at **(713) 658-9898.**

ALL FEES ASSUMED BY CLIENT COMPANIES

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PERSONNEL SERVICES

476 Houston Natural Gas Bldg.
1200 Travis
Houston, Tx 77002

DEC SYSTEMS PROGRAMMER

The J. R. Simplot Company is a large, rapidly growing agricultural conglomerate with Corporate Headquarters in Boise, Idaho. We offer an excellent benefits package, competitive salary structure and a professionally stimulating environment in the unique setting of the Intermountain West. Internal promotions have resulted in two openings in the MIS Technical Services section:

TOPS—20 SYSTEMS PROGRAMMER: responsible for operating system maintenance, enhancement and technical assistance to the MIS staff. Required qualifications include MACRO—10, COBOL, and FORTRAN experience. Data base and data communications are pluses.

NETWORK ANALYST: responsible for installation and support of our terminal and PDP—11 networks, as well as in—house consulting. This position requires skills in MACRO—11, with RSX, COBOL, and FORTRAN. DECnet is a definite advantage.

Send your resume and salary history in confidence to:

Simplot

J. R. Simplot Company
ATTN: Cecil Coupe
P. O. Box 27
Boise, Idaho 83707

An equal opportunity employer m/f/h

Coastal Maine
Technical Support Specialist

Due to our continuing technical growth, Hannaford Bros., Co., one of New England's largest retail grocers with annual sales of $500 million, is seeking a specialist to join our technical support department in Scarborough, Maine.

This position requires a professional with good communication skills that has had hands on experience with DOS or VSE operating systems plus a working knowledge of Database Management Systems. If you are a Systems Programmer and are familiar with Database support requirements of a VSAM or DBMS development environment or if you are an Analyst Programmer with proven operating system generation skills and would like to move up to a technical support position then we welcome your inquiry.

Hannaford offers a starting salary between $24,000-$28,000, fully paid medical, pension and life insurances, prescription and educational reimbursement, and relocation expenses. In addition the greater Portland area offers outstanding school systems, many colleges and universities, Threatres, the symphony, professional sports and all the other amenities that you would expect from a much larger metropolitan area but without the congestion.

If you have the above qualifications and seek to maintain a high level of professionalism while improving the quality of your lifestyle then send your resume with salary history to:

HANNAFORD BROS. CO.
Personnel Dept.
P.O. Box 1000
Portland, ME 04104
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O-R-T-U-N-E
Of Seattle Inc.

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SOFTWARE TEST, DEC or CDC, Mil. Specs, test procedures	28K
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PROG. ANALYST, IBM, DOS/VSE. CICS, 2+ yrs Exp.	24K
PROG. ANALYST, 370/168 or 3031, MVS, 2 yrs + exp. COBOL, MARK IV or PLI	24K
PROG. ANALYST, 370 or 3/15D, RPGII, JCL, 5 yrs exp.	23K

All inquiries are treated in the strictest confidence.

2200 6th Avenue, Suite 539
Seattle, WA 98121
(206) 682-0911

COMPUTER SYSTEM ANALYST

Booth Newspapers, a Michigan based group, seeks a computer analyst with newspaper experience. Responsibilities include support Atex frontend systems and the inter-newspaper communications network. To keep Booth Newspapers competitive in the eighties, challenges will involve design and implementation of systems for classified advertising, library automation, display ad terminal interfaces, page layout and other innovative changes. Attractive benefits package includes complete medical and dental insurance and tuition assistance. (We are located a few blocks from the University of Michigan campus.)

Please send resume and salary requirements to:

Mr. Ronald Klock
Booth Newspapers
P.O. Box 3007
Ann Arbor, Michigan 48106

OS/VS SYS. PROG.

People-oriented educational services org. has immediate need for a state-of-the-art, detail-thinking sys. prog. IBM 370/148 OS/VS1, IMS, CICS, BAL & COBOL environ. Outstanding fringe benefit pkg. to include 4 weeks vac. 1st yr. Salary $28,000 (fee paid). Contact Gerry Battista.

Robert Half of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200
Personnel Consultants

CAREERS IN DP MANAGEMENT CONSULTING

Nolan, Norton & Company is a rapidly expanding Boston-area consulting Firm specializing in the management of data processing in large organizations. We are seeking several professionals with combinations of analytical, data processing, and administrative backgrounds.

At NNC, you will have the opportunity to work with the senior managements of FORTUNE 500 companies in addressing top DP management issues:

- DP Strategy & Control
- Data Resource Management
- Distributed Processing
- Technology Planning
- Office Automation

Career positions are available on our consulting staff for candidates with strong analytical and conceptual skills plus an ability to communicate at the senior management level. Positions are available for:

- Management Consultants who work directly with senior client management. An MBA or CPA is highly desirable.
- Senior Management Consultant positions with immediate project management responsibilities are also available for candidates having extensive data processing/consulting experience.

Extensive training in NNC proprietary methods and techniques will prepare you for rapid growth in the Firm. Career paths lead to responsibilities in:

- Client Management
- Product Development
- Research Programs
- Project Management

The NNC compensation package includes liberal benefits and performance bonus opportunity. If you are interested in pursuing a career opportunity with us, please forward your resume in confidence to:

Benjamin S. Porter, Principal
Room 223

Nolan, Norton & Company
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Lexington, Massachusetts 02173
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If you're ready for a challenge, call (415) 765-3225 or send your resume to

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SYSTEMS PROGRAMMER

FLORIDA

Red Lobster Inns of America, the nation's foremost seafood restaurant chain has an immediate opening for a talented professional in our Orlando corporate office. Our environment consists of dual 4341 processors operating under VM and OS/VS1 using a CMS time sharing network.

The successful candidate for this challenging position will be a self-motivating individual with a background in OS/VS1 and/or VM/370, and will have at least 2 years systems programming experience.

We offer excellent salary and benefits including profit sharing and retirement plan, medical and dental insurance, paid relocation, and an opportunity for continued career development.

If you qualify, send your resume with salary history to Department JSC/SP-CW, Red Lobster Inns of America, P.O. Box 13330, Orlando, Florida 32859.

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COMPUTERWORLD

FPL

FLORIDA POWER & LIGHT COMPANY

EXCITING EDP CAREER OPPORTUNITIES

Florida Power & Light Company, Florida's largest electric utility has immediate openings in our data processing organization in Miami. We are a large multi-CPU shop using CICS, IMS DB/DC and MVS.

DATA BASE ANALYST

Minimum of two years experience in DLT data base design with five years total data processing experience. Bachelor's Degree in Computer Science preferred, or appropriate experience in Data Base Administration. Preferred experience in CICS/DLI and IBM's Data Dictionary.

We offer competitive salaries, an excellent benefit package, challenging work environment, relocation assistance and year-round outdoor living.

Qualified candidates who wish to be considered should mail their resumé and salary requirements to:

Mr. Robert H. McGough
Florida Power & Light Company
P.O. Box 529100
Miami, Florida 33152

AN EQUAL OPPORTUNITY EMPLOYER M/F

Systems Programmer

San Francisco Peninsula

Castle & Cooke is an international diversified food company, whose products include Dole Pineapple and Bumble Bee Tuna. Our expanding data processing facility in San Jose, CA currently has an opportunity for a Systems Programmer specializing in communications.

You will be responsible for providing technical support and assistance in use of installed software as well as providing consulting services to other DP facilities relative to hardware and software problems. Our present environment consists of two 4341s with a growing data communications network and data base using ADABAS. Future plans call for conversion from DOS/VSE to VM environment.

Successful candidate will be degreed in Computer Science and possess 3-5 years' experience in systems programming or technical support. Experience with the following software components required: DOS/VSE; ACF/VTAM; NCP; CICS; ADABAS/NATURAL.

We offer competitive starting salaries, excellent benefits, and the opportunity for career growth in our dynamic and consistently growing organization. We are located in downtown San Jose in the Park Center Plaza—convenient to buses and parking.

Qualified applicants please send a resume and salary history to: **Personnel Manager, P.O. Box 5130, San Jose, CA 95150.** Or call **(408) 279-8750, Ext. 4222.** Equal Opportunity Employer, M/F/H.

CASTLE & COOKE

Coral Gables, Florida
Information Systems Opportunities

The University of Miami is embarking on a course towards a true integrated information system. We are expanding our facilities to include an IBM 4341-M2, OS/MVS to complement our currently installed UNIVAC 1100/81A. In addition, the following positions have been funded:

Data Base Administrator (IDMS or DL/1.)
B.A. or B.S. in Business, Computer Science, Mathematics or Electrical Engineering. Five years experience as a systems designer and programmer and/or experience in large data base design. In addition, a minimum of two years supervisory experience.

Data Communications Specialist
B.A. or B.S. in Business, Computer Science, Mathematics or Electrical Engineering or an equivalent combination of education and experience. Three - five years of hands on communications experience. Must be able to function independently.

Sr. Systems Analyst
B.A. or B.S. in Business, Computer Science, Mathematics or Accounting. Analytical ability and effective interaction with people. Five-eight years experience in data processing systems development.

Software Specialist III
B.A. or B.S. in Business, Computer Science, Mathematics or Engineering, or an equivalent combination of education and experience. Minimum 2-3 years programming experience.

Sr. Programmer Analyst
B.A. or B.S. in Business, Computer Science, Mathematics or Accounting. Three- five years in programming with some supervisory experience including experience in systems design and implementation.

Programmer Analyst III
B.A. or B.S. in Computer Science, Business, Mathematics or Accounting. Two -three years programming experience or any combination of training and experience.

Join organization of growth and camaraderie which is dedicated to state-of-the-art-systems. Full range of benefits including tuition waiver through master level courses, corresponding 75% discount for dependents. Salary for all positions commensurate with experience. To be considered, state position desired and send resume and earning history to:

Louise Delphus
University of Miami
P.O. Box 249011, Coral Gables, FL 33124
Further information call 305/284-3515

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Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees. We guide, you decide.

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Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 230, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agents for Computer Professionals

SYSTEM PROGRAMMERS

SKK, Inc., a fast-growing Systems Software house located in the Chicago area, is seeking diversified System Programmers.

Responsibilities include maintenance and enhancement of our principle product, ACF2, and development of new Systems Software products on our in-house 4341.

The position requires sound knowledge and experience with MVS/JES. Experience with VS1, SE and SP is a plus. Exposure to other industry software products would be helpful.

SKK also has a position open for someone with experience in CICS generation, maintenance and macro level programming. experience with other DBMS systems desirable.

SKK offers competitive salaries plus excellent benefits including hospitalization, major medical, dental, prescription drug plan, life insurance, disability insurance, paid sick leave, tuition reimbursement and three weeks annual paid vacation.

Please send a resume in confidence to:

SKK

SKK, Inc.
10400 W. Higgins Rd
Suite 530
Rosemont, IL 60018
Attn: Jean Mazur

An Equal Opportunity Employer

medata

HP 3000
PROGRAMMER, ANALYST
COBOL, IMAGE, QUERY, KSAM

If you have a solid background in HP 3000 systems, and are seeking a challenging position with a rapidly growing company, you've found it.

Medata offers excellent advancement opportunities, pleasant working environment, and an extensive benefits package.

Financial relocation assistance will be considered. Salary commensurate with experience — $25-40k

Send resume in strict confidence to:
Ron Taylor
Vice President, Computer Services
MEDATA

801 north parkcenter drive; santa ana, ca 92706 714/968-1770

Seismic Data Programmers

The beaches, sailing waters and mountains of sunny Southern California await you. And if you are looking for an opportunity to develop new applications programs to solve exploration problems — you can have the best of both worlds.

An expanding International Division has openings for experienced programmers in a modern d.p. environment. Applicants should have

- a minimum of 3 to 5 years of experience in reflection seismic programming.
- a degree in earth sciences, physical sciences, math or computer science.
- a tested work history and solid references.
- IBM experience with sound knowledge of TSO, JCL and SPF.

Send your resume, salary requirements and available transcripts in confidence to:

union

UNION OIL COMPANY OF CALIF.
Rm. 240, P.O. Box 7600
Los Angeles, CA 90051

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U.S. Citizenship Required

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Ad closing is every Friday, 6 working days prior to issue date.

Rates: Open rate is $84.70 per column inch. Columns are 2" wide. Minimum ad size is 2 column inches (1 column wide by 2 inches deep), and costs $169.40 per insertion. Additional space is available in half-inch increments. Some sample sizes and costs are shown.

1 col x 4" — 338.80
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2 cols x 5" — 847.00
2 cols x 8" — 1355.20

Discounts are available when you run more than 35 column inches of advertising in a year anywhere in Computerworld.
Box Numbers are available. $10 per insertion.
Ad Closing is every Friday, 6 working days prior to issue date (issues are dated Monday).

To reserve space for your ad, or if you'd like more information on Classified advertising in COMPUTERWORLD, call our office nearest you.

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William J. Mills, Manager Classified Advertising

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PROGRAMMER/ANALYSTS

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Our computer system is an IBM 3032 with on-line and data base applications, running under OS/MVS.

We are seeking professionals with experience in any of the following application systems:

- Manufacturing Cost Accounting
- Payroll/Personnel (MSA)
- Shop Floor Data Collections
- Vehicle Maintenance Control
- Invoicing

You should have proven technical skills in COBOL. Experience in CICS or IMS/DL1 would be a plus.

Send resume and salary history to:

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Attn: Director of Personnel
P.O. Box 1936
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ALL REPLIES HELD IN STRICTEST CONFIDENCE. PLEASE FORWARD YOUR RESUME OR CALL THE OFFICE NEAREST YOU FOR IMMEDIATE RESPONSES.

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. . . SOUTH WEST . . .
12880 Hillcrest Rd., Suite 123
Dallas, TX 75230
(214) 991-2082

SYSTEMS ANALYST

Professional, challenging project team environment for on-line systems applications. We are looking for a systems analyst who will be a team leader, planning the activities of subordinate analysts and programmers. Will perform the analysis, development and implementation of systems and procedures to support applications for Users. He or she will use systems design methods and techniques to develop and write programming specifications. Future opportunities will exist to develop a distributed processing network and data base information management system. Demonstrated experience in project management, application of analyst and programming skills in COBOL and/or Assembler. Salary range $20,960-28,630 plus complete state benefits. Call 804/257-0556 or submit resume and state application by May 18, 1981 to **Division of Motor Vehicles, Employment Office, 2300 W. Broad St., P.O. Box 27412, Richmond, VA 23269.**

Division of Motor Vehicles
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Approximately $45,000

In 1978, the Department of Health Services of the State of California contracted with Computer Sciences Corporation to design, develop, install, and operate its Medicaid claims processing system. The current system results in payment of approximately six million claims per month totaling several billion dollars annually. On February 29, 1984, that $130 million contract will expire. To prepare for that day, the Department has created a new position to direct the activities related to: 1) management of a consultant contract for evaluation of the feasibility of alternative methods of performing Medicaid claims processing; and 2) development of a plan for and management of the implementation of the selected method.

If you are interested in this challenging position, send your resume with references to:

State of California
Department of Health Services
714 P Street, Room 1253
Sacramento, CA 95814
Attn: Deputy Director for Administration

Applicants should have at least five years of progressively responsible management experience related to: 1) competitive facilities management procurement processes; 2) facilities operation utilizing service contracts; 3) development of bid packages, evaluation of bidder proposals, and contract negotiation; 4) automated systems management; or 5) administration of Medicaid claims processing systems.

SYSTEMS PROGRAMMER

We are seeking a qualified and responsible Assembler **OS/MVS** Internals Systems Programmer, possessing at least two (2) years of experience, to support existing software and able to generate own systems. Salary ranges from 25K to 35K. Contact: Personnel at **Allen Services**

(Toll Free)
800-543-7583
(in Ohio)
(513-890-1200)

Research & Development Center for Individualized Schooling Computer Systems. Programming Specialist-Salary $15,120.

Maintain and enhance operating system's software. Formulate, design and implement software concepts to meet objectives of the Center. Participate in the design, fabrication and implementation of hardware interfaces. Create and maintain documentation for hardware and software. Maintain and update hardware and software systems. Assist staff in making optimum use of Center's computing resources.

Requirements: Bachelor's degree in Computer Science. Experience and training in operating system design, data base and file structure design, storage concepts. Hardware design experience desirable.

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Contact:

Evelyn Dick
1028 W. Johnson St.
University of Wisconsin
Madison, WI 53706
(608) 263-4210

COMPUTER APPLICATIONS CONSULTANT, ROME

An agricultural organization with headquarters in Rome and worldwide clients seeks a full time person to consult on software applications. Around 3 months travel per year.

Applicants should indicate background in agriculture, botany, or genetics; software packages used; fluency with programming languages; knowledge of languages other than English; and formal education.

Approximate Salary Range AFTER taxes: $20,000-$29,000.

Reply to Box 186, Durham, N.H., U.S.A. by June 15, 1981. Indicate when available.

COMPUTER PROFESSIONALS

Rensselaer Polytechnic Institute, located in upstate NY, is expanding its computing center staff in support of continuing improvements in academic computing and seeks experienced professionals in the following areas:

ASSISTANT DIRECTOR FOR ACADEMIC COMPUTING

Will provide innovative organizational and technical leadership in planning and resource management for a large academic center, utilizing an IBM 3033 with Michigan Terminal System (MTS) Software. Coordination through managers of a strong professional staff of academic computing consultants and systems programmers who support instructional and research computing. Plans and monitors evolution of progressive areas such as microcomputers, textprocessing and electronic mail in support of university programs. This senior position requires significant management experience and sensitivity to broad aspects of academic computing, and ability to interact effectively with faculty, students and staff. University teaching research and knowledge of MTS highly desirable.

MANAGER, ACADEMIC SERVICES

Reports to Assistant Director for Academic Computing, manages highly professional staff of academic computing consultants who provide support with special emphasis in mathematics, engineering, and other areas of high technology educational and research use of computing. Advanced degree; teaching, and experience in academic computing desirable.

MICROPROCESSOR CONSULTANT

Will provide technical support to develop the use of microprocessors in the academic and research programs. Required background includes strengths and experience in both hardware and software with a variety of personal computers and microprocessors. Considerable contact with faculty and students.

SYSTEMS SUPPORT SPECIALIST

Will enhance and support major areas of the 3033 operating system and related software. Prior experience with the internals of an operating system is required.

NETWORK AND COMMUNICATIONS SPECIALIST

Will participate in the design, implementation and support of a communications network using a mixture of "ether" and X.25 technologies using the IBM 3033 as one of several hosts. Previous communications and network design experience is required.

COMMUNICATIONS SYSTEMS PROGRAMMER

Will participate in the support and enhancement of communications software interfacing high speed asynchronous terminals and computers to the 3033 and in the extension of the software to serve as a local multi-node packet switching network supporting several intelligent hosts and network interface machines. Knowledge of DEC PDP-11 assembler language and previous experience with communications hardware and software is required. Familiarity with pascal and IBM 370 assembly language is desirable.

Related degree desirable for all positions. RPI offers salaries commensurate with experience and a complete benefits package which includes advanced educational opportunities.

For immediate consideration, interested and qualified applicants should submit a resume, 3 professional references and salary requirements by June 1, 1981, to:

Thomas F. Malloy, Employment Manager
Rensselaer Polytechnic Institute
Troy, NY 12181

Rensselaer Polytechnic Institute

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SYSTEMS PROGRAMMER ANALYST

Opportunity to broaden your horizon with a diversified range of state of the art hardware. New manufacturing applications are being developed to utilize the latest minicomputer technology interfacing with an IBM 3033 mainframe.

Requirements & experience include:

- COBOL Programming
- Mini-computer and IBM/JES2
- College Degree or Equivalent
- Willing to relocate to Tulsa, OK.

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TYMSHARE, a leading computer information and communications firm, has immediate openings in its national training facility in the San Francisco Bay Area.

You will use your technical knowledge and expertise to train our rapidly expanding computer maintenance organization. Experience instructing PDP-10, PDP-11, or VAX 11/780 systems is required.

QUALITY ASSURANCE SPECIALIST

You will apply your PDP-10/11 software experience to enhance the quality of hardware diagnosis capabilities and provide analytical analysis of failures to isolate system faults.

An indepth knowledge of TOPS-10 or TOPS-20 operating system internals, coupled with conceptual knowledge of hardware operation, is required. Strong interpersonal skills essential.

For more information, call Pat or Diana at 408/446-7612, or send your resume in confidence to Tymshare, Inc., 10231 Bubb Road, Cupertino, CA 95014, ATTN: Carson Janes

TYMSHARE

Hardware Support

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FLORIDA

EDP AUDITOR

Billion dollar international corporation based in South Florida has created an opening for a sharp professional to join its EDP audit staff. Your background should include a minimum of 2 years COBOL and project development in a large IBM mainframe environment or experience as an EDP Auditor for a national CPA firm. Incredible benefits, IBM state-of-the-art environment and a congenial work atmosphere can be yours. Fee paid.

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Data Processing Faculty Position

Teach courses in computer languages and data processing. Masters degree in related field required. Preference given to those who can also teach basic accounting or math and have had some business and/or teaching experience. Academic year position available 9/14/81. Rank and salary dependent upon background and experience. Send resume by June 1 to

Dr. William Bockley
Albany Jr. College
Albany, Georgia 31707

AA/EOE

SENIOR PROGRAMMER

Directs and controls activities of programming projects using the FORTRAN and Assembly languages in geophysical applications or systems. Assists programming supervisor in development of projects' plans and specifications. Provides technical counsel to staff who performs projects. Insures conformance to programming standards along with training system users in program capabilities. Participates in programming tasks. Monitors and reports progress to supervisor. **Requirements:** Bachelor of Science Degree in Computer Science or Physical Science, three (3) years experience in above areas. **Salary:** $2,000.00 per month, 40 hours per week. Please contact the Texas Employment Commission, Houston, Texas. J.O. #2215121. Ad paid by Equal Opportunity Employer.

SYSTEMS PROGRAMMER

The Department of Computer Services at East Tennessee State University is seeking a Systems Programmer with a degree in Computer Science and experience with IBM operating systems, preferably DOS/VSE and/or VM/CMS. The position is part of a three (3) member team responsible for support of VM, DOS, OS and other software on an IBM 4341. Review of applications will begin June 15, 1981 and continue until the position is filled. Send resume to:

Personnel Office
Box 24070A
East Tennessee State University
Johnson City, TN 37614

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SYSTEMS PROGRAMMER III

Salary $23,184 - $29,676 Depending on experience. A contemplated 7 1/2% may be added to the salary in October.

The University of Washington is seeking a senior systems programmer with Burroughs large systems experience, to perform general operation system software development and support. Knowledge of ALGOL, COBOL, DMS-II, and NDL is required. Opportunities exist in data communications hardware/software research and development. Liberal benefits package. Official University of Washington application must be received by 5 p.m. or post marked by midnight Monday, May 25, 1981.

The University of Washington
Staff Employment
1415 N.E. 42th Street
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Call collect or send resume
318-323-4410
American Executive Bureau
Data Processing Specialists
P.O. Box 2646
West Monroe, LA 71291

SENIOR PROGRAMMER ANALYST

Participate in the design and development of on-line application for administrative and academic users. Computing environment consists of an IBM 4331 running DOS/VSE and CICS with COBOL as the principal programming language. Applicants should have a Bachelors Degree and at least two years experience in developing systems in an IBM environment. Salary to $28K plus extensive benefits and vacation package. Send resume by 5/26/81 to **Personnel Coordinator, Somerset County College, P.O. Box 3300, Somerville NJ 08876.**

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JOB OPENING NOTICE

Systems Analyst-Project Leader

Analyzes business procedures and problems to refine data and convert it to programmable form for electronic data processing. Studies existing data handling systems to evaluate effectiveness and develop new systems to improve production or work flow as required. Conducts special studies and investigation pertaining to development of new information systems to meet current and projected needs. Operates B600, B1700, B6800. Masters degree, with major field of study Electronic Data Processing, required. Two years experience required. $18,000/year. **Programmed Closing System, INC., 3020 Atlanta Street, Smyrna GA 30080.**

Computer Systems Manager

With Computer Science AB or BS. Two years systems programmer experience. Must have knowledge of TOPS-20 equivalent to DEC's Monitor Internals Course. Duties: Install, maintain systems software; train, supervise operators; monitor systems performance; order computer supplies; help plan for future growth. Forty hours per week, 8 a.m.-5 p.m. $26,400 per year. Job in Salt Lake City.

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We offer competitive salaries, comprehensive benefits and a professional atmosphere in which to grow. For prompt, confidential consideration, please send resume to: **J. R. Miller, Professional Staffing**

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Total Readership — 525,000

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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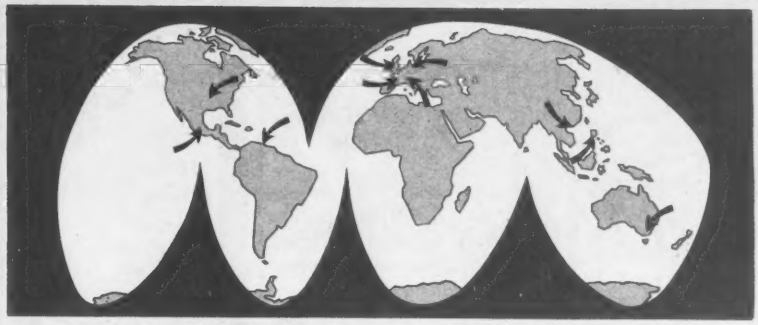

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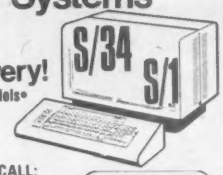

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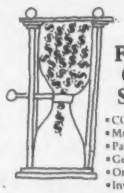

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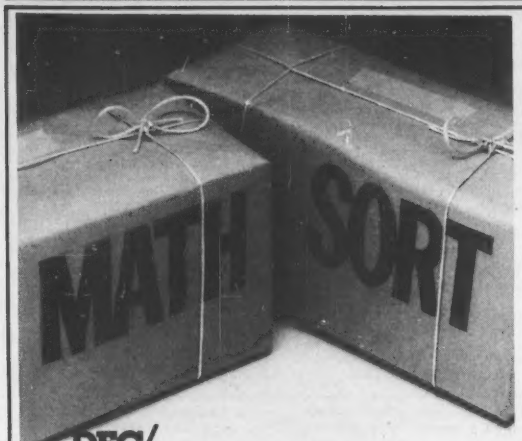

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American Terminal Leasing 68
Ampex Memory ID/9-ID/12
Ann Arbor Terminals ID/28
Apollo 25
Application Development Systems, Inc. 86
Arkay Computer 31
Association of Computer Users ID/29
Astrocom 44

BASF Systems Corp. 42-43
BDS Computer Corp. 9
John Beall 83
Bell Laboratories 89
Billings Computer 24
Boeing Computer Services 86
Boole & Babbage ID/4-ID/5
M. Bryce & Associates ID/30

California Datalease 35, 38
Capex Corp. 7
David Jamison Carlyle 94
Cincom/Systems Software 64, 98
Clary Corp. 28
Comp Ed ID/14
Comdesign 40, 85
Computer Associates 5
Computer Concepts 40
Computer Power Products/Div.of Sweinhart Electric Co. 84
Computer Products Marketing 6
Computer & Terminal Exchange 77
Computer Usage Co. 94
Continental Resources 13
Control Concepts 18
Control Data/MSG 82
Cullinane Database Systems Inc. 65
CW Broadcasting 20, ID/24-ID/25
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Data Access Systems 40
Databank 24
Data General 29
Datapoint Corp. 57
Datapro Research Corp. 91
Dataproducts 78
Datasouth ID/8
Data Systems for Industry 16
Data Systems Services 22-23, 76
Dataware 40
Dexel Systems Inc. 86
Digital Equipment Corp./Terminals 99
DIVA, Inc. 41
Dorlen Products 41
D.P. Facilities 94
Durango 80

Eastman Kodak 69
EDP Auditors Association,Inc. 19
Edutronics 60
Evolution Computer Systems Corp. 80
Execucom Systems 36

General Electric/Communications Equipment 75

Hewlett Packard 35
Honeywell Information Systems 49, ID/27
Houston Instruments 90
E.F.Hutton 97

Informatics 62
Information Concepts 19
Information Security 30
InfoSci ID/3
Innovation Data Processing 21
Input Center 92
Insac Software Inc. 67
Intel Commercial Systems Division 12, 72
Interactive Management Systems 81
International Digital Electronics 85
Intertel 97
ISSCO ID/34

Kevin Enterprises 87
Kierulff Electronics 70
Knight Programming Support Ltd. 86
KW Control Systems 33

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McCormack & Dodge 136
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Mini Computer Business Applications 32
Mini & Micro Educational Services 22
Moore Business Forms 34
MTI 14

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National Advanced Systems .....
National Computer Communications 71
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Policy Management Systems 26
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Protocol Computer ID/26

Qwikterm 14, 23, 88

Ramtek Corp. ID/31
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Scientific Data Systems ID/36
Selecterm 28
Signal Technology ID/18, 68
Sim-Ware 89
SITE 32
Software AG 37
Software International 93
Software Techniques 92
Squire Buresh Associates, Inc. 26
Storage Technology 79

Tandon Corp. 74
Technalisis 20
Technology Transfer Institute .....
Techtran Industries 94
Telex ID/22
Terminal Sales & Development 27
Texas Instruments 47, 73
Timberline Supplies 18
Tone Software Corp. 85
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United Peripherals .....
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Verbatim 87
Verhoef Information Packages, Inc. 72
Virtual Systems Software 15
VM Systems 16
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Xerox OPD ID/15,ID/16-ID/17

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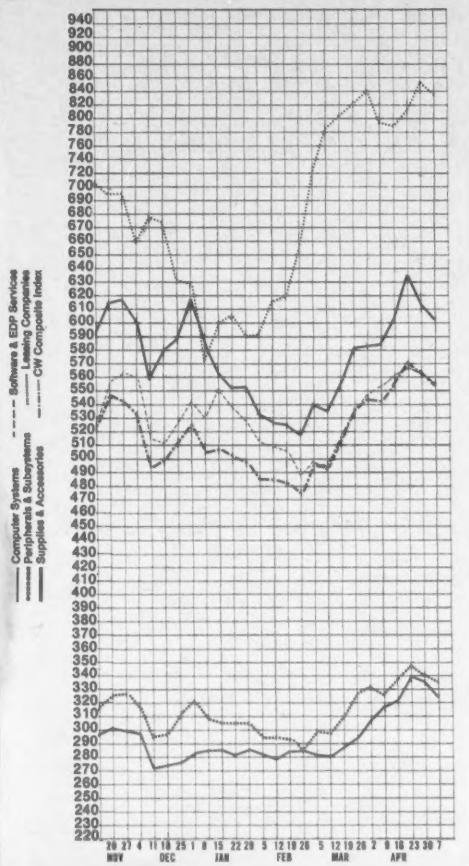

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES TUESDAY, MAY 5, 1981

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

E X C H		1980-81 RANGE (1)	CLOSE MAY 5 1981	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	15- 42	36	-2 1/4	-5.8
N	BURROUGHS CORP	44- [illegible]	44 7/8	+ 1/4	+0.5
O	COMPUTER AUTOMATION	9- 27	14 3/4	+ 1/2	+3.5
N	CONTROL DATA CORP	35- 79	75 1/4	-4	-5.0
O	CRAY RESEARCH INC	10- 48	38 1/8	-1 1/2	-3.9
N	DATA GENERAL CORP	46- 87	59 3/8	-1	-1.8
N	DATAPOINT CORP	22- 65	60 7/8	- 1/8	-0.2
N	DIGITAL EQUIPMENT	52-105	98 1/2	- 5/8	-0.6
A	EECO INC	6- 18	15 7/8	-1 3/8	-7.8
N	ELECTRONIC ASSOC.	6- 12	7 3/4	- 1/2	-6.0
N	FOUR-PHASE SYSTEMS	18- 48	33	-3 3/8	-9.2
N	FOXBORO	31- 82	53 1/2	-2 1/8	-3.8
O	GENERAL AUTOMATION	7- 18	15 1/4	+ 3/8	+2.5
O	GRI COMPUTER CORP	1- 3	1 1/2	0	0.0
N	HARRIS CORP	25- 60	54	-1 3/4	-3.1
N	HEWLETT-PACKARD CO	48-103	87 3/8	-1 3/8	-1.3
N	HONEYWELL INC	65-115	85	-1 1/2	-1.5
N	IBM	50- 79	57 3/4	-1 7/8	-3.1
O	MAGNUSON COMP SYSTS	20- 46	30	+ 1/4	+0.8
N	MANAGEMENT ASSIST	8- 25	14 5/8	-1 1/2	-9.3
O	MINI-COMPUTER SYST	1- 6	2 3/8	+ 1/8	+5.5
N	MODULAR COMPUTER SYS	9- 31	14 1/8	- 1/2	-3.4
N	NCR	32- 82	67 1/2	-1 3/8	-1.8
N	PRIME COMPUTER INC	10- 43	41 1/4	+2 5/8	+6.7
N	PERKIN-ELMER	13- 35	28 5/8	+ 1/2	+1.7
N	SPERRY CORP	42- 89	51 3/4	-4 1/4	-7.5
O	TANDEM COMPUTERS INC	13- 82	88 1/4	+2 3/4	+3.1
N	TEXAS INSTRUMENTS	78-130	110 1/2	- 1/2	-0.4
A	WANG LABS.	17- 80	34 1/8	0	0.0

LEASING COMPANIES

O	BOOTHE FINANCIAL CP	13- 27	24 3/4	+ 1/4	+1.0
N	COMDISCO INC	8- 24	20 3/8	-1 5/8	-7.3
A	COMMERCE GROUP CORP	1- 2	1	0	0.0
A	COMPUTER INVSTRS GRP	1- 4	5/8	0	0.0
O	CONTINENTAL INFO SYS	2- 15	6 1/2	- 5/8	-8.7
M	DATRONIC RENTAL	3- 5	4 1/4	0	0.0
A	DCL INC	3- 6	3	0	0.0
N	DPF INC	5- 12	10 1/4	- 1/4	-2.3
O	ITEL	1- 15	1	0	0.0
O	LEASPAC CORP	1- 2	3/8	0	0.0
A	PIONEER TEX CORP	2- 4	3 1/4	0	0.0
N	RELIANCE GROUP INC	24- 84	77	-2 3/4	-3.4
N	U.S. LEASING	12- 30	24 3/4	-2 1/2	-9.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

O	ADVANCED COMP TECH	1- 6	5 3/4	0	0.0
O	ADVANCED SYSTEMS INC	12- 15	14 3/4	0	0.0
O	ANACOMP INC	7- 24	18 1/8	-1 3/4	-8.3
O	ANALYSTS INTL CORP	3- 14	7	- 1/4	-3.4
A	APPLIED DATA RES.	8- 24	20 1/4	-1 1/4	-5.8
N	AUTOMATIC DATA PROC	31- 63	58 3/4	+ 1/2	+0.8
O	CGA COMPUTER ASSOC	8- 17	11	- 1/4	-2.2
O	COMPUTER HORIZONS	1- 5	2	- 1/4	-11.1
O	COMPUTER NETWORK	4- 8	4 3/4	- 3/4	-13.6
N	COMPUTER SCIENCES	11- 30	20 5/8	-1 1/8	-5.1
O	COMPUTER TASK GROUP	1- 23	18 1/4	0	0.0
O	COMPUTER USAGE	2- 10	3 1/4	- 1/4	-5.5
O	COMSHARE	11- 21	15 1/2	+ 1/4	+1.6
O	CULLINANE DATABASE	18- 65	54 3/4	-4 1/4	-7.2
O	DATA DIMENSIONS INC	1- 6	1 5/8	- 1/8	-7.1
O	DATATAB	1- 4	1 3/8	+ 3/8	+37.5
O	DSI CORP	4- 9	5 3/8	+ 1/4	+4.8
O	DYATRON CORP	4- 11	8 3/4	- 1/4	-2.7
N	ELECTRONIC DATA SYST	19- 51	48 5/8	+ 5/8	+1.2
O	INFORMATICS INC	5- 33	26 3/4	-2 3/4	-9.3
O	INSYTE CORP	1- 3	2 1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 4	1 1/4	0	0.0
O	KEANE ASSOCIATES	3- 9	5 1/2	0	0.0
O	KEYDATA CORP	1- 5	3/4	0	0.0
O	LOGICON	12- 34	29	-3 7/8	-11.7
O	MATHEMATICA INC	5- 18	14 1/4	+ 1/2	+3.6
O	MATHEMATICAL APP GRP	7- 33	22 1/2	-1	-4.2
O	NATIONAL DATA CORP	5- 25	22 3/8	+ 7/8	+4.0
N	PLANNING RESEARCH	5- 13	7 1/4	0	0.0
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	4- 11	8 3/8	+ 7/8	+11.6
O	REYNOLDS & REYNOLD	19- 34	20 1/2	- 1/4	-1.2
O	STSC INC	6- 28	19 1/2	+ 3/4	+4.0
O	SCIENTIFIC COMPUTERS	3- 17	10 3/4	0	0.0
N	TYMSHARE INC	17- 56	47 3/4	-3	-5.9
A	URS CORP	5- 17	15 5/8	0	0.0
N	WYLY CORP	4- 20	12 1/2	-1	-7.4

PERIPHERALS & SUBSYSTEMS

N	AM INTERNATIONAL	11- 24	13 3/4	- 3/8	-2.6
A	ANDERSON JACOBSON	8- 25	18 7/8	0	0.0
O	AUTO-TROL TECHNOLOGY	18- 62	23 3/4	-2 1/4	-8.6
O	BEEHIVE INT'L	2- 18	15	0	0.0
A	BOLT-BERANEK & NEW	8- 25	21 1/2	-1 3/4	-7.5
N	BUNKER RAMO	17- 83	48 5/8	- 5/8	-1.2
O	CAMBRIDGE MEMORIES	1- 9	7 1/2	+2 3/8	+46.3
N	CENTRONICS DATA COMP	13- 88	12 3/4	- 1/2	-3.7
A	CETEC CORP	3- 8	7 1/8	- 5/8	-8.0
O	COMPUTER DEVICES INC	5- 10	8 1/4	- 1/2	-5.7
O	COGNITRONICS	1- 11	9 1/8	+ 7/8	+10.6
O	COMPUTER COMMUN.	2- 10	2	- 1/4	-11.1
O	COMPUTER CONSOLES	4- 29	24 1/2	-1 3/4	-6.6
O	COMPUTER TRANSCEIVER	1- 6	5 7/8	+ 1/8	+2.1
N	COMPUTERVISION CORP	24- 95	81 1/8	-2 3/8	-2.8
N	CONRAC CORP	13- 25	21 3/8	+ 1/8	+0.5
O	DATA ACCESS SYSTEMS	8- 23	13 1/8	+1 1/8	+9.3
A	DATAPRODUCTS CORP	11- 44	36 1/4	-2 5/8	-6.7
O	DATUM INC	2- 5	3	+ 1/8	+4.3
O	DECISION DATA COMPUT	2- 6	4 3/4	+ 5/8	+15.1
O	DELTA DATA SYSTEMS	1- 3	2 5/8	0	0.0
O	DATARAM CORP	6- 37	9 7/8	- 5/8	-5.9
N	ELECTRONIC M & M	3- 9	5 1/4	- 1/8	-2.3
O	EVANS & SUTHERLAND	21- 94	93	+2	+2.1
O	FABRI-TEK	1- 4	3	0	0.0
O	GENERAL COMPUTER SYS	1- 12	8 3/4	- 1/2	-5.4
O	GEN'L DATA COMM IND	8- 22	14 3/4	-1 1/2	-9.2
O	GENERAL TERMINAL CP	1- 4	1 1/4	-	-4.7
N	HAZELTINE CORP	12- 33	22 3/4	+ 1/8	+0.5
O	INFORMATION INTL INC	8- 15	11	0	0.0
O	INTRAL CORP	23- 50	36 1/2	-1 3/4	-4.5
A	LUNDY ELECTRONICS	4- 17	10	-1 1/4	-11.1
O	MSI DATA CORP	5- 21	18 5/8	0	0.0
N	MEMOREX	10- 34	12 1/4	-1	-7.5
N	MOHAWK DATA SCI	10- 31	23 1/4	- 1/8	-0.5
O	NETWORK SYSTEMS CORP	14- 25	20 1/2	+ 1/4	+1.2
O	OMEX	2- 12	9	0	0.0
A	PARADYNE CORP	9- 48	41 3/4	-2 5/8	-5.9
A	PENRIL CORP	9- 17	14 1/2	- 5/8	-4.1
O	RAMTEK CORP	10- 23	20 1/2	0	0.0
O	RECOGNITION EQUIP	5- 21	14 7/8	- 1/2	-3.2
O	SCAN DATA	1- 5	2 1/4	-	-2.6
N	STORAGE TECHNOLOGY	12- 31	28	0	0.0
O	SYKES DATATRONICS	14- 55	50	-3 1/4	-6.1
O	T BAR INC	14- 24	18 7/8	- 1/2	-2.5
A	TEC INC	3- 9	4 7/8	+ 3/8	+8.3
N	TEKTRONIX INC	42- 90	58 3/8	-1 7/8	-3.1
N	TELEX	3- 8	7	- 3/4	-9.8
O	TESDATA SYSTEMS CP	8- 26	9 1/2	- 1/2	-5.0
A	TIMEPLEX INC	5- 22	12 1/2	- 1/2	-3.8
O	WILTEK INC	1- 3	3	- 1/8	-4.0

SUPPLIES & ACCESSORIES

A	AMERICAN BUS PRODS	8- 16	15 5/8	+ 1/8	+0.8
O	BALTIMORE BUS FORMS	1- 2	1 1/4	0	0.0
N	BARRY WRIGHT	8- 22	18	-1 1/8	-5.8
O	CYBERMATICS INC	1- 2	1 1/4	0	0.0
A	DUPLEX PRODUCTS INC	11- 16	14 1/4	- 3/8	-2.5
N	ENNIS BUS. FORMS	13- 21	17 5/8	-1 3/4	-9.0
N	3M COMPANY	46- 65	58 3/4	-2 1/4	-3.6
O	MOORE CORP LTD	27- 38	35 5/8	-1 3/4	-4.6
N	NASHUA CORP	20- 35	22 3/4	-1 1/8	-4.7
O	STANDARD REGISTER	22- 35	33 1/4	- 1/2	-1.4
A	TAB PRODUCTS CO	9- 30	20 1/4	-2 1/4	-10.0
N	WALLACE BUS FORMS	12- 28	24 7/8	- 3/8	-1.4

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